A

THE DISEASES OF WARM COUNTRIES

A Handbook for Medical Men

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EDITOR'S PREFACE

EVERY one who has read Professor Scheube's work in the original must have been struck by the accuracy of statement, the range of knowledge, the logical inferences, and the thoroughly scientific spirit which characterises the book It must have occurred to all who read the book in German that its translation into English was most desirable, amounting indeed to a public duty, and the fact that Messrs John Bale, Sons and Danielsson undertook the publication of a work of the kind, places those interested in scientific medicine and in Tropical Diseases deeply in their debt

The work of editing the book has been rendered simple by the excellence and accuracy of the translation by Miss Pauline Falcke and if in some places the German idiom has been retained, it has been done advisedly, for to attempt to transcribe it in every instance would but have served to detract from the virility of Professor Scheube's style

Ever since Professor Scheube's work appeared in Germany the desirability of reproducing the work in English has occurred to many The magnitude of the task no doubt is the cause of the translation not being undertaken earlier, and the question of obtaining a sufficient sale for the work may have caused publishers to hesitate It may be urged that some of the statements, in the light of research during the past twelve months, have lost their significance, but the general volume of information can never be refuted, but must remain for all time as a monument to Professor Scheube's labours, and as a comprehensive and accurate record of tropical diseases at the period of publication

JAMES CANTLIE

Devonshire Street
London, W 1902

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I

PLAGUE.

DEFINITION.

The word *Plague* in ancient and mediæval times had a general pathological signification every epidemic disease which swept off a large number of the people being a[illegible] In more modern times, however th[illegible] an infectious disease running a[illegible] a serious general condition an[illegible] outbreaks the bubonic type prevail[illegible]

SYNONYMS

[illegible]
glan[illegible]
Pest[illegible]
(Rh[illegible]
Plu[illegible]
rog[illegible]e, cough illness (India) Yang tzu [illegible], boil or itching wound) Yang tzu ping

HISTORY AND GEOGRAPHICAL DISTRIBUTION

The history of Plague may be traced back to a period dating from the end of the third or the beginning of the second century B.C. In Oribasius' Medical Excerpts there is a passage by Rufus of Ephesus [illegible]

[illegible]

none was more terrible, nor attained such dimensions as the pandemic of

the fourteenth century, known as the *Black Death*, "which as regards social and political conditions had the most terrible consequences, it actually caused a loosening of all prevailing conditions, even of the most intimate family ties, and it had as a consequence, in the truest sense of the word, a deterioration of all social and friendly relations" (*Pagel*) No portion of the then known surface of the globe was spared by this visitation, and even distant Greenland was smitten and depopulated According to Hecker's computation, twenty five millions of persons, that is to say, a fourth part of the population of the Eastern hemisphere at this period, fell victims to this epidemic in Europe alone

As the seventeenth century waned the epidemics in Europe occurred less frequently, and since the middle of the eighteenth century Western Europe until quite recently has been almost free from the disease. The south east of Europe, Turkey, Caucasus, South Russia, Italy, Dalmatia, Greece, and the islands of the Mediterranean have, during the nineteenth century, been visited by epidemics from time to time The last outbreak occurred in the year 1841 Since then Europe, with the exception of a small epidemic in the Government of Astrachan (Wetljanka), 1878 1879, has not been visited by plague until quite recent times, and it is only within the last few years that plague seriously threatened Europe

The *European epidemics of plague* were all probably *imported from the East*, a fact that can be positively proved to be the case during the last century or two The channel by which plague entered Europe hitherto has always been by way of Turkey, and it has invariably been Turkey which formed the bridge over which plague travelled from Asia to reach Europe

In Asia plague, like cholera, has its *endemic centres*, starting from which it spreads in an epidemic form at longer or shorter intervals It cannot, however, be conclusively stated which country is to be regarded as the actual home of plague Certain facts, however, point to the probability that the disease has its seat in *Southern Thibet*, on the *northern declivity of the Himalayas* The source of the epidemics in India and South China may presumably be sought for in this locality

Plague has been known in *India* for a very long time. Even in one of the Paránas,[1] which is at least eight hundred years old, instruction is given to leave the place as soon as an epidemic is observed among the rats—an order which undoubtedly refers to plague From time to time the country has been visited by epidemics of plague, which sometimes spread over a larger or smaller area, and sometimes occurred simul taneously with the great European epidemics, sometimes, on the con trary, the disease had only a small circumscribed area of extension, being [illegible] al, situated on the south- [illegible] sease known here by the [illegible] Thibet into the adjacent [illegible] d in the valleys This centre, to which attention was first directed in 1878 by Rocher, an official employed in the service of the Imperial Maritime Customs of China, has its centre in the town of Mengtsz, and has lately attained great importance, for it undoubtedly formed the point of departure of the present great pandemic of plague The disease exhibited itself repeatedly in Lien tschau

[1] A number of comprehensive poems containing theological and philosophical teachings, ritual writings and legends, are in the literature of Hindostan called Paránas.

on the Gulf of Tongking, afterwards spreading from the latter tung in March 1894 in May of the same year it attacked Hong Canton and later was transmitted to Amoy In 1895, Swatow, Macao and many other places in South China were attacked, e following year the disease re appeared on the coast of China ad to the island of Formosa In August, 1896, the plague y broke out in Bombay Probably the introduction of the disease cted by means of the maritime commerce from the Chinese ports erted, on the other hand that it was spread from the hinterland pilgrims from North India (Kumaon and Gurhwal), where in 1893 94 outbreaks of Mahamari had been reported om Bombay the disease gradually spread over a large portion of the e peninsula and has retained a firm footing there up to the present with only periodical and local undulations From the autumn of to January 1899 about a quarter of a million persons succumbed ie plague Nor was the disease limited to China and India Off ots of the China Indian epidemic spread to Madagascar Mauritius, mion, Mozambique, Delagoa Bay the Philippines (Manila) Japan, the idwich Islands New Caledonia Australia (Adelaide Sydney) Djeddah ez Alexandria and even to Europe and America Isolated cases have peatedly been brought to European ports (London Plymouth Trieste) vertheless without bringing further cases in their wake and in June 899 an epidemic broke out in Oporto Quite lately plague even made is appearance in Paraguay (Asuncion) Brazil (Santos Sao Paulo, Rio le Janeiro) and Argentina (Rosario) This is the first time on record that plague has shown itself in the New World The old opinion moreover that plague is unable to pass the equator has been quite upset by the present epidemic, and it is impossible to foresee in what direction and how far, it still may wander

Matignon reports that since 1888 plague occurs every year with more or less vir lence in the valley of So leu ko in North China, on the borders of Mongolia but it is not known how and by what way it was first imported there

A second centre of plague and one long known is situated in Meso potamia, and to this centre the epidemics frequently occurring in Persia more particularly in the province of Azerbijan may be traced back and there is also probably some connection between this centre and the epidemic in Wetljanka (Astrachan) mentioned above as also with the outbreaks of plague occurring near Samarcand (Russian Turkestan) in 1898, and in Kolobovka (mouth of the Volga) in 1899

A third plague centre exists in the mountainous district of Assir on the west coast of Arabia but as yet it has attained no great importance, as widespread epidemics have not originated there

We are indebted to Robert Koch for our knowledge of a fourth endemic centre in the interior of Africa probably in Uganda Koch in common with Zubitza established the fact that the disease which for some years has prevailed in Kisiba the extreme north west of German East Africa and which is by the natives called *Rubwunga* is identical with plague The disease which has been endemic in Uganda for ages was undoubtedly carried thence to Kisiba This centre is undoubtedly the source of the former epidemics in Egypt and the other countries on the north coast of Africa, and was carried principally through the importation of slaves Egypt has for ages been frequently afflicted by epidemics of plague of which the last one—apart from the recent out break in Alexandria—occurred in 1844 while in Tripoli in the district

of Benghasi, various epidemics, the origin of which was hitherto shrouded in mystery, broke out in 1856 59 and in 1874 This African plague centre may attain overwhelming importance on completion of the railway now in course of construction between Mombasa in British East Africa and Uganda

outbreak

ETIOLOGY.

which was discovered ultaneously and inde has been fully con on of the plague sent from Germany, Austria, Russia &c A most striking and sad confirmation of the discovery was yielded during the laboratory experiments in Vienna in 1898, the origin of which was traced to the cultures of the microbe brought from Bombay, and which caused the loss of life of three persons

The specific factor in plague (see fig 1, plate I) is a short, thick *bacillus*, endowed with very slight or no movement, the ends are rounded off, and it shows some similarity to the bacillus of chicken cholera It is easily stained with aniline dyes—weak, watery solutions of methylene blue or much diluted Ziehl s solution are particularly suitable—but not by Gram's method, the ends take the stain more easily than the middle The bacillus exhibits great variability in form and size, every transition occurring, from short, almost spherical bacteria to extended rodlets It is surrounded by a mucoid cortex which, however, it is not easy to demonstrate It is usually found presenting the appearance of a diplo bacillus, but is also sometimes seen united in short chains Spores have not been observed

The plague bacillus, according to Bitter, appertains to the *septicæmic microbes*, inasmuch as in animals of very great susceptibility it passes directly into the blood without any visible local reaction taking place Microbes in those cause a local reaction, and iese the anthrax bacillus is unique position amongst others, the local reaction sets in, not on the place of inoculation, but in the corresponding lymphatic glands

The plague bacillus, in the first place, is found in the *buboes* which represent the primary seat of the disease, and to which, in slight cases it remains restricted When streak preparations of bubo juice are made one sees in typical cases—besides pus corpuscles, cellular detritus, and numerous red blood corpuscles originating from hæmorrhages—such vast numbers of the bacteria that the contents of the bubo seem to consist of these only In preparations of sections of buboes also, in which the bacilli lie partly in the gland cells and partly in the lymph spaces, their number, as compared with the number of the gland cells, is positively overwhelming (Kolle) When the buboes begin to suppurate, the bacilli rapidly disappear

Besides being present in the glands, the bacilli, in serious cases, are found in the *blood* and in *all the interior* organs, especially the *spleen*, but

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d, the growth, however, is very slow It thrives within a wide range of temperature It develops almost equally well between 37°[1] and (about) 25°, it grows at between 10° and 15°, though more slowly, and even at 5° (refrigerator temperature) These qualities are invaluable for isolation of the plague bacillus from mixed bacteria

Plague like disease can be produced in animals by means of *inoculations* with cultures, and also by the juice of buboes and sections of the organs of plague cadavers As to the susceptibility of the various species of animals, the conditions are, according to the experiments of the German Commission, as follows —Birds and pigs are refractory, cats and dogs exhibit a weak reaction sheep, goats, cows and horses a strong reaction Monkeys, and all rodents in particular, are highly susceptible. Rats possess the greatest predisposition of all animals, and may be fatally

likewise causes infection

In rats and mice also plague likewise occurs under natural circum-

[1] All temperatures given in this book are according to Centigrade scale

stances, an observation which had already been made in the epidemics of former centuries, but which was particularly noted recently on the occasion of the Chinese and Indian epidemics In Canton the seizure of human beings was preceded for two or three weeks by wholesale mortality amongst rats, these left their holes in shoals, staggered about over each other, finally falling down dead, and this occurrence was repeated in every newly plague infected part of the town According to Janson, in one division of the town alone more than 35 000 dead rats were collected This observation, so frequently made, has led to the opinion that plague is really *a primary disease of rats*, and is first transmitted from them to man It has been asserted that other animals, such as pigs, dogs, jackals and snakes sicken spontaneously with plague, being infected by having devoured diseased or dead rats, or human plague cadavers, but this statement requires further investigation for confirmation [1] In Hardwar (India) plague is also supposed to have affected monkeys which had taken possession of deserted plague stricken dwellings

The plague bacillus has been but seldom found outside human and animal organisms although it has been discovered a few times in dust sweepings, and water contaminated with fæces (Kitasato, Wilm Hankin, Leumann)

Outside the body the plague bacillus possesses a relatively slight capacity for resistance It soon perishes in water, and it is rapidly destroyed by disinfectants, by being heated, and by sunlight The bacillus is also very sensitive to desiccation, when rapidly carried out—as by means of a high temperature or in the exsiccator—whereas slow drying up at a low temperature is less harmful Therefore if dried up in a tropical climate it perishes much more rapidly than in a temperate climate Pure cultures protected from light and desiccation, preserve their power of development for months It follows, therefore, that the bacilli may preserve their capacity for development in dark and damp places and as, as mentioned above they thrive even at a very low tem

[1] According to a report by Locans (*Brit Med Journ* December 2 1899, p 1,588) plague was also observed in cats (cervical buboes with bacilli) in Mauritius

ably well by the plague bacillus. Kasansky found cultures viable after being exposed to the cold of winter for five months at a temperature of 31°, during four months of which time they were completely frozen through.

moniæ, so that there is a *mixed infection* which may originate from ulcerated tonsils, pneumonic centres of the lung and buboes without or after surgical interference. The suppuration of the glands is to be attributed to the appearance of suppurative agents, and after the appearance of the latter the bacilli disappear. Sticker always found staphylococci and streptococci when actual abscess formation had set in, but these microbes were never confirmed when there was only puriform breaking down of the bubo with initial liquefaction of the same and subsequent absorption, or artificial evacuation of the chocolate coloured contents. Carbuncles according to Bitter are probably originated by

carbuncles.

body through

When the skin

mph passages

Europeans who wear foot gear, inguinal gland affections are most frequent, thus proving that the inoculation takes place by way of the lower extremities, although they are exposed to less injuries than the hands. It would therefore seem as though the region of the inguinal glands is the *locus prædilectionis* for the development of the plague bacilli in the body.

The point of entrance at the time of the illness is no longer visible, because during the period of incubation the small lesions heal, and as *a rule no local reaction sets in at the seat of infection. It is only quite* exceptionally that the point of entrance is observable as small papules, blisters, or pustules containing bacilli. In consequence of infection taking place at autopsies plague has often been transmitted to doctors and their attendants.

The *respiratory organs* form another point of entrance for the bacilli. Plague pneumonia is doubtless to be traced to infection by inhalation, but, as the plague bacilli have no capacity for resisting desiccation, the transmission must take place less by way of the dried bacillus in dust than by the tiny drops of sputum containing bacilli diffused by plague patients when speaking, coughing and sneezing (*Flugge's drop infection*).

In one small series of cases the infection, according to the Austrian

ccording to Wilm's investiga

disease may be received into

through eating infected food

(according to Janson by partaking of the flesh of plague sick pigs) or drinking infected water. Wilm also found, in contradistinction to the results of the investigations of the German Commission, that the bacilli were still viable for two days in ½ per cent. solution of hydrochloric

acid, and he even confirmed their presence in the water of an open well that was exposed to contamination Though Wilm s observations have not been confirmed by others, his opinions are supported by the fact that plague can be experimentally induced in animals by this method of infection (Bandi and Stagnitta Balistreri), and that the mortality amongst rats is largely due to typical intestinal plague

The *period of incubation* fluctuates between thirty six hours and ten days, the average being four to six days Exceptionally it may extend longer, even to twenty days

The *spread* of the disease takes place by means of *persons*, *animals* and *inanimate objects*

In regard to the first method of transmission, a great deal depends on the form of illness exhibited Cases belonging to the simple bubonic form play a very unimportant part, the bacilli, in this form, are already imprisoned in the buboes, and when these suppurate and burst open the bacilli have mostly already perished Septicæmic cases, on the other hand, are very important for in these during the last stage of the disease, the bacilli are in the blood, and may escape thence by way of the numerous internal and external hæmorrhages, and may therefore find an outlet by means of the vomit, stool, urine, sputum, &c The pneumonic ... may be easily

... ness is proved

Animals, above all, as already mentioned *rats*, are greatly implicated in the spread of plague As was confirmed by the German Commission, myriads of virulent bacilli are evacuated by plague stricken rats in their urine and fæces, and human beings may come into contact, directly or indirectly, with the same and thus become infected Rats play an important part in the spread of the plague on board ship ...

... stings or when it is by chance crushed on the body or trodden on, and gain entrance by small superficial wounds Hankin and Simond succeeded in experimentally transmitting the disease to rats and mice through infected insects, whereas Nuttall s experiments in this direction ...

... ars that plague may be spread by ... used by plague patients, such as ... be disseminated by merchandise ... e plague bacilli, under favourable conditions, possess a far greater power of resistance than one is led to expect from experiments made in the laboratory As an instance, corn sacks may form a means of infection by having harboured diseased rats ... had made their way into granaries and there died

When plague has been carried into a place the spread is very slow From the time of introduction until the appearance of the first local case weeks and months may elapse In two examples from India, quoted by [illegible] as eighty six or eighty seven days [illegible] ound the imported case and affect [illegible] have become infected by nursing [illegible] es it is undoubtedly a question of [illegible] There then follow some sporadic cases in neighbouring houses and then also in distant quarters of the [illegible]

when, as a rule, it decreases as slowly as it had first increased and dies out or it may drag on with fluctuations for years During the epidemics in Bombay and in Hong Kong, plague infection seemed to cling pertinaciously to certain localities In some houses the inmates all succumbed to the disease, whilst in adjacent houses the people were altogether free or but slightly affected with plague

In explanation of this phenomenon, also, the rats probably play their part After the subsidence of an epidemic, sporadic cases occur, sometimes for years, and sometimes, even, there is a recurrence of the plague without a new introduction having taken place It is probable that the illness has been maintained in the interim by rats The same is probably the case also in the districts in which plague is endemic, epidemics developing from the sporadic cases from time to time Probably in endemic centres of rat plague a certain immunity to the disease is engendered amongst the rats as the disease passes and re passes from animal to animal One may imagine, also, that the rats spread the disease during the course of their travels, which are undertaken in consequence of unusual phenomena of nature, such as floods, earthquakes, &c They thus carry plague into healthy regions, the non immune rats of the locality acquiring the disease in the severe form and dying wholesale

Probably other animals also are responsible for the maintenance of the plague germ The above mentioned plague like disease (see p. 6) in East Siberia is traced to [illegible]

Seasons and *atmospheric temperature* exercise a certain, but not very important influence on the origin and spread of a plague epidemic Moderate warmth, in conjunction with moisture, seems the most favour

[1] See *Journal Trop Med.*, Clemow, February 1900

able atmosphere for the development of the plague germ In the cooler regions of the East, and formerly in Europe, the epidemics usually occurred in the summer In Central Egypt, particularly in Cairo, the epidemics were apt to subside at the height of the summer, during the prevalence of intensely dry heat, epidemic outbreaks never starting at this period of the year In Mesopotamia plague principally appeared during the coolest weather and practically ceased during the hottest season In India, also, it is markedly during the cooler months that plague prevails In most of our cities, as, for instance, in Bombay, the height of the epidemic occurs in the "winter" In a few towns, however, the opposite observation was made It is certain that the meteorological conditions alone do not in this respect come into account, but exercise their influence on the manner of living of the population Whereas the nat [illegible]
open air, they in [illegible]
retire into their [illegible]
and covers, and close up every aperture to keep out the cool night air. It stands to reason [illegible] able influence on the spread of the [illegible] ing to Wilm, the plague in 1894 and [illegible] in 1896, on the contrary, it raged during the cooler season and stopped suddenly when the hot weather set in Taking into consideration the power of resistance the plague bacillus exhibits to frost it is not surprising that epidemics have been observed during the severest winter weather (in Moscow in 1771 and in Astrachan 1878 1879)

Neither the *geological character of the soil* nor a high elevation above sea level has any influence on the occurrence of the disease In India plague has been observed at a height of over 10,000 feet

On the other hand the development and spread of plague is influenced in a great measure by the *unfavourable hygienic conditions, essentially connected with social misery* Agglomeration of dirt in the houses and in the streets, defective removal of fæcal and other animal excretory matter, crowding and insufficient ventilation of the dwellings, bad and insufficient food, &c, all help as predisposing causes of illness The poorer part of the population are always stricken most heavily, occasionally also they are the only victims It was on this account that Cabiadis designated the plague "*miseriæ morbus*" If amongst the population of a town or country the peoples of different races and nationalities are attacked in an unequal degree, this is attributable less to the racial difference than to the different hygienic conditions under which they live In Canton, during the epidemic of 1894, the foreigners with [illegible]

environment, were most seriously afflicted In regard to mortality, the Japanese, Portuguese, Manila folks and Indians took a position between the Europeans and Chinese In Bombay the Europeans and Parsees suffered least, the Mohammedans and Hindoos most, whilst the Jains (Hindoo caste) and Jews took the position between

The increase in cleanliness and the improvement of public and private

[1] *Brit Med Journ*, September 15, 1894, p 615

hygiene have decidedly played an essential part in the disappearance of plague from Europe

Sex exercises no predisposing influence Both sexes are equally attacked When pregnant women are taken ill they usually miscarry and die

Age appears to determine in some degree the onset of plague, persons between the ages of 20 and 30 years are most frequently attacked, infants at the breast very rarely contract plague Leumann

This immunity may perhaps be explained by the fact that people engaged in occupations of the kind are freer from vermin The reports of later epidemics, however do not support this theory In Bombay, barbers, servants jockeys grooms washermen agricultural labourers, artisans spinners and weavers corn and flour dealers, bakers and fruiterers were in particular, most severely attacked (German Commission) According to Yamagiwa, *those persons especially who have to do manual labour* and those whose occupations lay them open to injuries are most liable to be attacked by plague

The *predisposition* to the disease is not always extinguished by once having had the same A second attack of the same individual has occasionally, even in the same epidemic been observed Sometimes only a few weeks elapse between the first and second illness The second attack mostly has a fatal termination

The causes usually assigned as determining the onset of ailments, such as chills, mental and bodily exertions errors in diet fright fear of the disease, previous illnesses &c are all regarded as playing a part in the initial development of the illness

SYMPTOMATOLOGY

Plague may cause signs and symptoms of so diverse characters that several forms of the disease are now differentiated Of these the most frequent and most typical is bubonic plague

1 Bubonic Plague

The outbreak of the actual disease is but rarely preceded by *prodromal* symptoms which when present consist of indisposition languor, &c

In most cases the *onset of the illness is sudden*, with high fever which is sometimes, but not always, ushered in by one or more rigors and, in the case of little children, by convulsions it is accompanied by very severe constitutional disturbances, and pronounced bodily and mental weakness

Pain and enlargement in some group of glands generally accompany the initial development of fever, or they may appear, according to Lowson, somewhat later—on the second day as a rule It is also noticeable that in many instances the bubo even precedes the rigor In addition there is headache usually localised in the frontal or temporal region, giddiness which may increase to severe delirium, loss of appetite, at the commencement there is sometimes nausea and vomiting, occasionally, also, diarrhœa, pains in the epigastrium, and aching in the back and limbs Oppression and drowsiness, or, on the contrary, restlessness and a feeling of anguish and sleeplessness obtain The speech becomes thick, the gait tottering, so that the patient conveys the impression of a person severely intoxicated Soon stupor sets in, accompanied by a quiet passive condition of mind, or, more rarely, wild delirium develops In severe cases the patients already, on the second or third day, exhibit a pronounced typhoid state, with deep prostration, accompanied by muscular twitchings and also tonic and clonic spasms Sometimes, on the other hand, the brain remains perfectly clear until death

The *type* of *fever* in plague is more or less markedly of a continued or remittent type The temperature mostly rises rapidly, and either on the first but more frequently on the second day, its highest point—often 40 5° to 41°—*is attained More rarely the rise of temperature* takes place gradually On the third or fourth day it sometimes goes *down 1°, 1½°, or more, and in slight cases it may fall to normal*

Generally, however, the temperature rises again, seldom, however, *to its former height, and then between the fifth and seventh day it sud*denly sinks to normal or subnormal Often the temperature rises again *and a remittent suppurative fever, due to a secondary invasion of strepto*cocci, ... of glands is followed
by a r ... y
pneur ... re
rises ... d
from ... m
of this statement (figs 2 to 5)

The *pulse*, as a rule, is at first full and dicrotic, later very small, and but rarely irregular and unequal The number of beats mostly averages 120, being seldom below 100, but many rise to even 140, 160, or more per minute

The *respiration* also is accelerated to from 30 to 40 respirations per minute

The *skin* feels burning hot and dry until the third or fourth day, when should the temperature fall it becomes moist When the afebrile period sets in there is almost always perspiration, which is maintained for a day or two, more particularly at night

The *patient's* face at the commencement of the illness is mostly reddened and somewhat puffy, the expression is dull, often anxious, the eyes are sunken and glistening, *the look staring, the conjunctivæ are* more or less injected

The *tongue* is at first *swollen and moist, and exhibits a white coating* which has been compared to chalk or mother o' pearl Later on the *tongue becomes dry and fissured*, and, in addition, the teeth, the lips, and the nostrils are covered with dark crusts The *tonsils* are occasionally ...

laryngitis has been
gravest significance

(Müller)

The *heart*, at an early stage of plague shows signs of dilatation and *murmurs* are frequently heard at the apex or over the pulmonary artery

As to the *blood*, the red blood corpuscles are often considerably diminished and moderate leucocytosis is present

The *abdomen* is sometimes distended the spleen enlarges at an early stage of the disease—on the second or third day—but it seldom extends beyond the costal margin by more than a few centimetres the liver also enlarges to a slight extent as a rule

The secretion of *urine* is diminished and occasionally quite suppressed Aoyama and Bitter often observed retention of urine, so much so that *the catheter had to be used The urine is dark with a strong acid* reaction, exhibits a high specific gravity and deposits urates it fro [illegible]

seldom observed The Austrian Commission observed in nearly all cases a considerable decrease of chlorides

Buboes are the most characteristic signs of plague The glands attacked become rapidly enlarged and may attain the size of an apple or fist and may attain even larger dimensions The pain increases with the enlargement and is often so great that the patients groan and wail at other times however there is but slight pain and then only when pressure is made on the glands The buboes most frequently develop in *the inguinal region* but extend downwards into Scarpa's triangle Next

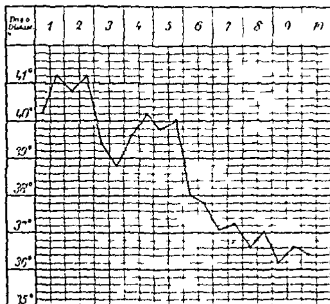


Fig 2 —Pulsatile plag [illegible] of the buboes [illegible]

Fig 3 Bubonic plague with carbuncle Suppurative fever Recovery

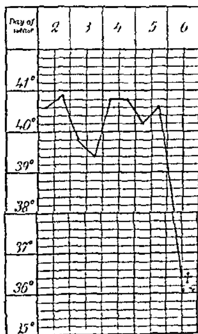


Fig 4 —Bubonic plague Sepsis Death

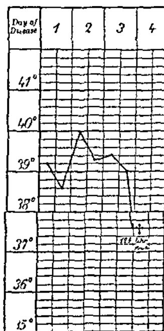


Fig 5 —Pneumonic plague Death

frequency buboes develop in the *axillary region*, where, as in the - - the deepest seated glands are primarily affected Next in frequency . · *lower jaw* and *neck* The glands of very rarely affected Any peripheral ome the primary seat of infection dren most frequently attacked, owing of putting all sorts of things in the outh When axillary gland buboes are present the supraclavicular ands are also more or less affected

Of this nguinal 589 on of these

The symptoms which indicate *internal buboes* are oppression, pains in e depth of the abdomen, and pains in the lumbar region.

According to the statements of the German Commission the *lymphatic* of the *mucous membranes* may be attacked Of these there eration in one

several ie same enlarge her may come at between mptoms sin soon o longer e felt separately, not can they be felt he skin smooth, painful infiltration ensues, over which the skin is reddened and becomes œdematous

The buboes may become absorbed, they may leave an induration and hickening of according o Wilm's obs lace in 90 pe and suppuration generally come to maturity during the course of the second week sometimes the suppuration is prolonged for weeks, one gland after the other forming into abscesses Phlegmonous changes and gangrene may

e cervical and submaxillary glands the disease, for the plague bacilli, or nearer proximity to the centre of circulation, invade the blood stream far more quickly than those further

FIG 3 —Bubonic plague with carbuncle Suppurative fever Recovery

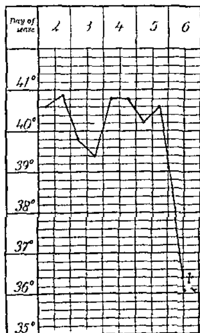


FIG 4 —Bubonic plague. Sepsis Death

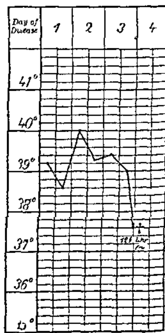


FIG 5 —Pneumonic plague Dcath

in frequency buboes develop in the *axillary region* where as in the groin the deepest seated glands are primarily affected Next in frequency come the glands at the *angle of the lower jaw* and *neck* The glands of the elbow and the popliteal space are very rarely affected Any peripheral lymphatic gland may however become the primary seat of infection

ttacked owing
things in the
upraclavicular

of these with secondary buboes at the submax llary angles and in one case buboes of the glands adjacent to the hyoid bone

Usually only one group of glands becomes affected more rarely several In the latter case these do not usually all become affected at the same time but one after the other The glands of a group do not all enlarge in the same degree one may attain the s ze of a hen s egg another may only become as large as an almond wh le the others do not become at

A smooth painful infiltration ensues over which the skin is re ldened and becomes œdematous

The buboes may become absorbed they may leave an indurat on and th ckening of the glands but more frequently they *sup p urate* According to Wilm s observations made in Hong Kong in 1896 suppurat on takes place in 90 per cent of the cases Absorption takes place in mild cases and suppurat on in mild cases as well as n severe The abscesses generally come to maturity during the course of the secon l week Sometimes the suppuration is prolonged for weeks one gland after the

monous changes and gangrene may

e cerv cal and submaxillary glands
the disease for tl e plague bacilli or

their products fro n the glands in nearer proximity to the centre of circulation invade the blood stream far more quickly than those further

distant (Yamagiwa)
infiltration of the
and œdema of the
Commission)

Pustules, *boils*, and *carbuncles* are observed far more rarely than buboes and may be more frequent during one epidemic than in others They are apt to appear between the first and seventh day of disease A brown spot the size of a lentil may form on any part, most frequently the extremities Its appearance is heralded by a feeling of heat and pricking or itching pains The skin surrounding the lesion becomes bright red and indurated A small blister develops over the spot with opaque contents and dark red border, the swelling increases in size and may attain the dimensions of a hazel nut The base of the blister necroses and forms a black scab After this has been removed by suppuration a black crater like ulceration with a dry base appears, which may finally cicatrise But on the other hand inflammatory changes may lead to widespread necrosis whereby wide areas of muscle are laid bare and

In the former case they
fection and a glandular
swelling appertaining thereto appears secondarily The two manifestations may be connected by a distinct lymphangitis, over the course of which during the illness there may crop up occasionally numerous blisters pustules or smaller boils

Sometimes the lesions remain limited to the skin These cases are distinguished as a particular form of plague under the name of *cutaneous plague* or *pustular* plague The general symptoms are the same as those of glandular plague, but are mostly of a milder type and the termination, apart from the local destruction is often favourable (Sticker) Occasionally the carbuncles have an abortive course, drying up without further local or general symptoms having set in (Pruner)

Secondary plague boils only come under observation during the course of the development of the buboes They form over or near to the buboes, and are apt to be multiple They are often very numerous and are apt

punctiform partly as linear stripe like lesions, but occasionally they are much larger, and of a red black, or lead coloured hue occasionally they are so numerous that almost the entire skin is covered by them Hæmorrhages may also occur from the nose, mouth lungs stomach, intestine, kidneys and female genitals, women in consequence often miscarry The hæmorrhages usually appear at the height of the illness from the third to the seventh or eighth day, but sometimes they set in during the first stage Some epidemics are distinguished by the frequency of such hæmorrhages, whereas as in the last epidemics in Hong Kong and Bombay, they were rarely seen

The following are stated by the German Commission to be additional signs and symptoms of infection extreme feebleness of the heart with complete paralysis of the peripheral arteries, severe symptoms of irritation of the stomach and intestine with uncontrollable vomiting and diarrhœa and evacuation of clots of blood At the same time there is almost always great tenderness in the stomach and iliac regions and pains in the loins At autopsies considerable hyperæmia and an ecchymosed

During the later stages of the disease secondary *pyæmic* conditions such as abscesses, gangrenous erysipelas, parotitis and inflammation of the thoracic glands, changing to suppuration and gangrenous disintegration sometimes develop (Jablonowski)

The German Commission observed quite early, often on the second but even on the first day of the disease, occasional parenchymatous *inflammation of the cornea*, which attacked both eyes more frequently than one. The result was frequently irido cyclitis with complete destruction of the eyes due to suppuration this concomitant is probably also due to secondary infection

Death may take place in any stage of the disease, but most frequently occurs on or about the third or fifth day Sometimes it occurs quite suddenly in consequence of cardiac paralysis but is sometimes heralded by a very frequent small soft hardly perceptible and often irregular pulse, coldness of peripheral parts with internal heat, occasional cyanosis or lividity of the face hiccough and subsultus tendinum In other cases death is caused by suffocation in consequence of extensive inflammation of the cervical region by severe hæmorrhage from the lungs from the large femoral veins being laid open by suppuration and gangrene, from meningitis septicæmia or even marasmus

When plague has a favourable termination a gradual decline of the virulence of each symptom takes place and the *convalescent stage* is reached Convalescence usually sets in at a period varying from the end of the first to the fourth week It is generally of long duration, and sequelæ often develop (see below) so that usually one to four weeks elapse before recovery During convalescence the decrease of the vitality of the tissues is remarkable incised wounds often remaining unchanged for days Buboes which have suppurated take from one to three months to heal The rapid course of pulmonary tuberculosis in plague convalescents, who before having plague only suffered with slight chronic pulmonary disease shows a considerable disturbance of vital power (Sticker)

2 Septicæmic Plague, Plague Sepsis, or Blood-plague

(The PESTIS SIDERANS of older observers)

This variety of plague, owing to the presence of the bacillus in the blood partakes of the nature of a general infection rather than of a local bubonic character In addition to buboes which are frequently accompanied by secondary glandular enlargements in other parts of the body, a seemingly slight bronchial catarrh may develop and in a few cases symptoms of general sepsis appear, without a primary lesion on any part of the body having been visible during life These cases according to the experience of the German Commission are characterised by high fever, with a very frequent weak pulse delirium or immediate collapse, a rapidly developing sensitive splenic enlargement, some tenderness of many lymphatic glands (or all those accessible for examination) without distinct enlargement stomachic and intestinal hæmorrhages The presence of the plague bacillus in the blood is generally only confirmed a few hours or more rarely a day or two previous to death, and is sufficient to indicate an early fatal termination This, as a rule, takes place on the second or third day sometimes even within the first twenty four hours

3 Pneumonic Plague, or Pulmonary Plague.

Childe first called attention to this form of plague. It is ushered in by a chill, followed by increase of temperature, headache, dizziness and pains

per minute, cyanosis, diminished resonance over one or more lobes of the lung and rhonchi The fever is high, remittent or irregular (see fig 5, p 16) the pulse is frequent and weak There is complete prostration, sensitiveness of peripheral lymphatic glands and a splenic enlargement, often of considerable size That, however, which is of great importance for a differential diagnosis is the fact that, as happens in the other forms of plague, herpes never appears (Childe) The expectoration, in typical cases, consists of a sanguineous fluid, which is sometimes expectorated in enormous quantities and in which multitudes of plague bacilli are found, either in pure culture or mixed with other bacteria, such as diplococcus pneumoniæ, streptococci or the bacilli of influenza (see fig 6, plate I) Rust coloured sputum, as in ordinary pneumonia, is rare Frequently, also, cough and expectoration are completely absent (Russian Commission) In most cases pneumonic plague has a fatal termination, which as a rule takes place on the third or fourth day through œdema of the lungs

Sometimes the illness has a course similar to that of simple bronchitis without pronounced general and local symptoms, and death occurs quite unexpectedly (Hossack)

Pneumonic plague occurs much more frequently than is generally supposed, often escaping recognition Persons suffering with chronic pulmonary diseases, especially phthisis, are particularly susceptible, the plague bacillus seemingly finding a favourable soil for its settlement in tuberculous centres In plague epidemics, therefore, the mortality of

hæmorrhage was a prominent feature In some of these epidemics as for instance those in Gujerat and Ahmadabad (India) in 1820, and in Pali

the consequence of a secondary infection

4. Intestinal Plague.

A form of the disease which Wilm observed in Hong Kong in 1896 may be designated intestinal plague It runs its course without buboes and its predominating features are disorders of the intestinal canal, vomiting and diarrhœa with the evacuation of blood and mucus, so that the entire illness can be classed as an intestinal ailment, *post-mortem* examination demonstrates the fact that the intestinal mucous membrane is the seat of pathological change Such cases never came under observation during the first epidemic of plague in Hong Kong (1894), nor were they observed in Bombay

5. Pestis Minor and Abortive Ambulatory Plague.

Mild cases of plague, which occasionally are observed to precede or follow plague epidemics in infected countries for months or even years, are designated *pestis minor* The disease may be acute or may run a more chronic course during which without any symptoms of serious indisposition without even fever, buboes usually of the inguinal glands [illegible] It is stated that [illegible] eceded for two or [illegible] continued for two [illegible] lague on the south coast of China idiopathic buboes prevailed there Epidemics of the kind have, however been observed without being accompanied by plague, and, on the other hand, actual plague also occurs without preceding or subsequent pestis minor An illness designated glandular sickness occurred in the town of Astrachan in 1877 more than 200 cases came under observation, they all had a favourable course and no development of a plague epidemic came about (Simpson) Pestis minor appeared in Singapore and the Straits Settlements at the same time as it did on the coast of China, actual plague however only broke out there in 1899 Pestis minor was observed in Calcutta during 1895 and 1896 actual plague however, only appeared there in 1898

There are no reports as to the incidence of pestis minor in Bombay

Cunningham found bacilli in the blood in cases of pestis minor in Calcutta they were however non infective and did not seem identical with true plague bacilli, which it is to be noted are only found in the blood in the latest stages of plague Pestis minor moreover is not distinctly contagious, nor during its prevalence has disease amongst rats been observed From these grounds it seems to me questionable if the cases of illness which have hitherto been called pestis minor have anything at all to do with plague, or if they are not more likely identical with *climatic buboes* which symptomatically resemble them This question can only be [illegible]

[illegible], short attacks of fever unusual perspirations pains in the limbs, &c That these are really *abortive* cases of plague is proved by the facts that the patients reside in houses or belong to families that at the time were severely visited by plague that the disorder leaves behind a weakness or great excitability of the heart which often persists a long time, and, as seen by the German Commission in two cases the patients sometimes are

18 2 per cent , of 10 Japanese, 60 per cent , of 13 Indians, 7 7 per cent In 1896, according to Wilm, the mortality in Hong Kong averaged 85 per cent , in Formosa, according to Ogato, 56 1 per cent , and in Bombay, according to Yersin, in 1896 1897, 50 per cent of the Europeans and 85 per cent of the natives who were attacked, died

The following *sequelæ* are to be noted glandular suppuration of

vascular paralysis continuing for weeks aphonia and aphasia, jaundice deafness dumbness, paralyses of different kinds (of the face, eye muscles palate and larynx also hemiplegia and paraplegia) ataxia, and aberrations of mind The German Commission is of opinion that the above mentioned disturbances of the nervous system are in all probability intoxications

PATHOLOGICAL ANATOMY.

Plague cadavers frequently exhibit no emaciation Rigor mortis is mostly pronounced

The most marked constant, and characteristic pathological changes in plague are met with in the lymphatic system All the lymphatic glands *of the body are more or less affected Even in cases* such as pneumonic plague, in which there is no primary bubo enlargement of separate groups of glands occurs It will thus be noted that there is no form of plague without glandular affections even when these are not always perceptible during life on account of their deep situation, or in consequence of their small *size softness or painlessness or the corpulency of the patient* Besides the glands the lymphatic apparatus of the various organs parti

entrance of the plague
gic character from the
n by way of the blood
ay a serous, gelatinous

fluid, and is permeated by more or less extensive hæmorrhage This œdematous hæmorrhagic infiltration, by means of which the borders of the separate glands are frequently entirely obliterated, may extend still *further to the adjacent adipose* tissue, fascia, muscles vascular and nerve sheaths The veins adjacent to the buboes occasionally exhibit infiltrated walls and hæmorrhages into the intima affording the plague bacilli a means of entrance into the blood (Bitter) The glands on section appear of a dark red colour, which is either diffused over the whole of the cut surface, or it occurs merely as dark specks dotted over the surface The tissue of the gland is often so soft and pulpy that it breaks down and runs

away on incision As a rule no difference is perceptible between cortex and the interior, and no prominence of follicles can be dist guished The lymphatic vessels in the vicinity of the hilus are usua found considerably enlarged

The *microscopical* examination exhibits acute inflammation with extr vasation of blood The tissue is infiltrated with red blood corpuscle leucocytes, and bacilli According to Yamagiwa the process commence in the capsule the periglandular tissue, and the subcapsular lympt sinuses The walls of the veins are infiltrated and relaxed—a fact that explains the occurrence of the hæmorrhages

If suppuration of the buboes occurs either a simple abscess formation is found, as in bubo from soft chancres, or a necrosis of the gland substance has taken place

The characteristic changes described may be limited to a single gland, which then represent the primary seat of disease

In other cases the primary bubo extends considerably superficial buboes frequently binding with the deep glands of the abdomen and thorax Thus the inguinal buboes may proceed by way of the femoral ring to the sacral and lumbar glands and along the spinal column to the diaphragm, while the cervical and axillary buboes proceed towards the mediastina In such extensive buboes the more peripheral glands, according to Sticker show a milder and the glands situated nearer the centre of the body a more severe degree of disease although the newer stage of the process appertains to the centrally situated glands and the older stage to those in a peripheral situation

In *secondary enlargements* of the *lymphatic glands*, the buboes are not usually of so large a size nor is the hæmorrhagic character so pronounced as in the primary buboes They exhibit a greyish red colour on their cut surface they are not so juicy and the infiltration in their vicinity is also absent According to Bitter the bacillary contents are very different generally in the primary bubo enormous numbers of bacilli are met with but no more are found in the secondary glandular hyperplasia than in the blood and spleen and sometimes there are even far fewer

The *general tendency to hæmorrhage* is a further pathological charac teristic of plague This tendency is exhibited in numerous hæmorrhages in the most diverse interior organs such as the stomach, intestine, kidneys, urinary passages on the serous membranes &c They are most pronounced, however in the septicæmic form Hæmorrhages into the cutaneous tissues also occur though not so frequently as those in the organs and in some epidemics especially they are so numerous that the whole body appears black hence the designation of *Black Death*

ls to the remaining pathological appearances, the *brain* and *cerebral* ieninges are usually congested and occasionally exhibit hæmorrhages ometimes a serous or sero suppurative exudation is found in the eticulæ of the pia mater particularly along the vessels and the iantity of fluid in the cerebral ventricles is increased both contain merous bacilli

The *spinal meninges* exhibit the same changes as the cerebral ninges

Ecchymoses occur on the *pleura* but exudations are seldom met i in the pleural cavity, in primary buboes of axillary glands pleural iges occasionally occur on the affected side

he *lungs* as a rule are œdematous and deeply congested especially e lower lobes, hypostasis hæmorrhages, and hæmorrhagic infarct ometimes found It is very rarely indeed that the lu

With cervical

/pical confluent
bean to an egg
with blackish red hæmorrhagic patches and œdema in their vicinity are found mostly unevenly distributed over both lungs especially the lower lobes When on the surface of the lung these areas exhibit recent pleurisy on their serous aspects A sticky stringy juice exudes from the incised surface of these lung patches In mixed infection lobular hepatisation is also found in different stages In two cases observed by Sticker the croupous foci exhibited so severe a necrosis and hæmorrhagic infiltration that the lung tissue was on the point of breaking down which, had it taken place would have caused serious hæmoptysis explaining a condition that has been observed in several epidemics The bronchial tubes contain a frothy sero sanguineous fluid and the mucous membrane of the respiratory tract is reddened Under the microscope the alveoli of the lungs in the pneumonic areas are found to be almost exclusively filled with blood and bacilli a few leucocytes and fibrine may be present The septa of the alveoli become involved and readily break down The bronchial glands as also the other groups of glands may be either enlarged or normal The foci in the lungs form the primary seat of disease

The *heart* especially the right ventricle is mostly dilated Petechiæ or ecchymoses are often found beneath the visceral layer of the serous pericardium The myocardium is frequently seen to be pale the paren

degeneration

In the lungs and also in the spleen the kidneys and the muscles necrosed patches forming abscess like foci varying in size from a mere speck to a hazel nut and surrounded by a hæmorrhagic area are sometimes met with These foci are especially rich in bacilli (Austrian Commission) The bile is copious of varying consistency and the wall of the gall bladder is sometimes œdematous Cholecystitis and pericholecystitis have been met with

extent it is
Occasionally

but seldom
increased in size

The mucous membranes of the *stomach* and *intestine* frequently exhibit petechiæ and ecchymoses and occasionally also hæmorrhagic erosions are found in the stomach Aoyama saw follicular hyperplasia in the stomach in a few cases The solitary follicles and Peyer s patches of the intestine are frequently swollen Wilm often observed small ulcers with undermined edges yet without an eschar in the intestine

Wilm found the *mesenteric* glands to be frequently but only slightly swollen

The retro peritoneal glands when involved become of a dark bluish red colour and are frequently met with in the softening stage surrounded by extravasations of blood

The blood vessels and lymphatics between the affected glands and the intestine are seen to be mostly dilated and of a reddish or reddish blue

colour, extensive hæmorrhages occur also between the layers of t mesentery.

The *kidneys* are often enlarged and congested, the cortical substanc thickened and the parenchyma in a state of cloudy or fatty degeneratio The surface of the kidney capsule the mucous membrane of the pelvi of the kidney, and the peri nephric tissues are frequently the seat of more or less extensive hæmorrhages

The pelves of the kidneys are sometimes occupied by coagulated blood, proceeding even into the ureter

The *urinary bladder* is sometimes filled with bloody urine, and its mucous membrane ecchymosed

Sticker found the *bone marrow* in a condition of swelling and hyper emia.

DIAGNOSIS

The diagnosis of plague is difficult particularly at the commencement of epidemics In severe cases it has to be differentiated from malignant cases of *malaria typhus* and perhaps also from *recurrent fever* Mild cases may be taken for *venereal buboes* and other *inflammations of lymphatic glands* Skin lesions in plague may be mistaken for *anthrax*, and pneumonic plague for *croupous pneumonia*

The epidemic character of the disease the severe general symptoms ushered in with high fever and the presence of buboes serve to charac terise the disease Even though the latter may not be present in septicæmic cases the presence of buboes in other cases allow no doubt as to the diagnosis It may be necessary to distinguish dengue fever from plague, in dengue we find slight enlargements of the inguinal axillary and cervical glands but the severe pains in the joints and muscles, the peculiar exanthema and the benign character of the ailment are sufficient to differentiate between the diseases

In doubtful cases more especially those in which no buboes develop *bacteriological examination* is of primary importance Besides fluid from buboes, the sputum (in the pneumonic form) the blood (in the septicæmic form) urine (taken under aseptic precautions) the contents of pustules and boils may all be used for examination Should the microscopical examination not confirm the diagnosis cultures should be made either on agar agar or in bouillon and then experiments on animals conducted with these cultures. The Austrian Commission recommend guinea pigs as the most suitable for this purpose

The *serum diagnosis* is of less practical importance True the serum plague patients generally reacts specifically (agglutinating effect) on solution of pure culture of plague bacilli in the same way as typhoid rum on typhoid bacilli and cholera serum on cholera bacilli this ction however is on the one hand never extant during the primary ge of the disease when it would be of particular importance and on other hand is not present in all cases

Zabolotny s experience was that serum of plague patients did not utinate at all during the first week it agglutinated slightly during the nd week, and during the third and fourth weeks (convalescence) it utinated powerfully Moreover according to Sticker, the aggluti g effect of the serum only appears distinctly after very severe cases ness, and the severer the illness the more distinct the reaction ntirely in abortive cases and is even occasionally lacl

lescents from severe attacks (German Commission) The serum diagnosis can therefore not be applied for the elucidation of the open question as to the relation of pestis minor to actual plague, this can only be decided by the examination of fluid from the bubo or of an excised lymphatic gland

PROGNOSIS

Plague surpasses all other infectious diseases in danger, and is there fore always a very serious illness The prognosis, in the first place, depends (1) on the *character* of the existing *epidemic* which may be more or less malignant (2) on the period at which the illness sets in attacks during the later period of an epidemic being as a rule milder than those at the beginning (3) on the *age* of the person attacked—strong adults are relatively less endangered than children and old people, who nearly always succumb (4) on the *position of the primary bubo* inguinal buboes giving the most favourable cervical buboes the most unfavourable, prognosis while axillary buboes take a medium position The *condition of the heart* is of great importance, a full and regular pulse is a good sign [illegible] blood—all these are unfavourable prognoses and almost without exception, indicate approaching death Should the patient survive the sixth day a favourable termination may be hoped for as according to Wilm, 70 per cent of all patients succumb within the first six days Suppuration of the buboes is not in itself a favourable sign, except in so far as suppuration usually only occurs in the second week, so that the patient must by then have already survived the most critical time

PROPHYLAXIS.

The correct diagnosis of the first cases of plague is as in cholera of the greatest importance If these are recognised it is quite possible to nip the epidemic in the bud or at least to confine it to a small centre This result is more likely to be obtained in plague than in cholera as plague at the commencement of its appearance amongst a community spreads more slowly than does cholera It is therefore the duty of the respective States on the appearance of suspicious cases of disease, to at once send competent experts to the place to confirm the nature of the illness and [illegible]

disinfection of the house together with the effects of the inmates, the destruction and subsequent burning of the *rats* and *mice* and also strict *house to house inspection* for the discovery of concealed cases The dwellings in the vicinity of the plague stricken houses must be treated in the same manner as those found to be infected

[illegible]

weaker, are also to be recommended on account of the simplicity of their use and th
cheapness

In *India* the method of removing those suspected of contagion (contacts) to segreg
t on camps is highly to be commended These segregation camps consist of hu
quickly improvised of bamboos and mats and situated in open fields After ten day
during which time their dwellings are disinfected the contacts are allowed to return t
their homes Should cases of plague occur in these segregation camps the huts i
question are burned Sublimate and lime are principally used as disinfectants th
walls of houses are washed down with a solution of sublimate and are then freshly
whitewashed Moreover the slates are taken off the roofs to afford entrance to light
and air and should the floor be a mud floor it is dug up to a depth of four inches and
d sinfected with chlorinated lime

As Wilm was able to confirm bacilli in the urine,[1] for four to six weeks after the expiry of the first acute stage of the disease it is necessary that the isolation of the patients in cases of recovery should be maintained for six weeks It is advisable also to provide the patients with mosquito nets, in order to prevent a possible dissemination of the plague by means of insects (mosquitoes fleas flies &c) In pneumonic plague it is advisable that doctors and attendants should protect themselves from the danger of contagion from the particles of sputum sprayed out from the patient's mouth in coughing, &c by tying sponges over their mouths and noses, these sponges to be disinfected every time after use The patient should be covered with a fine meshed veil The bodies of persons who have died of plague should be—as soon after death as possible—well coffined and buried in graves at least three metres deep, or cremated

Wilm considers that strict superintendence of the water supply is imperative Articles of food gnawed by rats in times of plague should be destroyed Perhaps also, attention should be directed to cattle about to be killed for food more particularly pigs

It is of great importance when plague breaks out in a country to have the *first plague centre* entirely *barricaded off* by a military cordon This is quite possible if the centre be a small one, as amongst other instances was evidenced in the little town of Noja in lower Italy in 1815 but even a strictly maintained blockade has been rendered illusory through the medium of rats Once the illness has however gained a hold and taken in larger areas of land which is mostly apt to be the case before plague is recognised and the efforts to establish a diagnosis are overcome the cordon principle is no longer practicable Then nothing remains to be done except to *supervise* as strictly as possible the lines of communication the country roads the railways the rivers and canals along which traffic passes At certain junctions sheds should be erected in which all travellers coming from plague stricken districts should be medically xamined and the sick or suspects should be isolated and their linen lothes and other belongings disinfected although it is better to burn the hings belonging to the patients In the plague stricken towns departing avellers should be examined at the railway stations and at the docks fore embarking

As long as an epidemic rages *all arrangements connected with the embling of crowds*, such as annual fairs parties excursions &c should *prohibited* The pilgrimages to Mecca are a great danger to the stern Hemisphere, immense numbers of persons from all the Moham lan countries assemble here yearly among whom an outbreak of plague ht have most calamitous consequences Having realised this danger

[1] Gotschlich lately also found virulent bacilli in the sputa of three cases of ry from pneumonic plague weeks after seemingly complete restoration to health

several States have, during the latter years, forbidden the pilgrimages to Mecca or have at least restricted them

As the importation of plague into other countries can take place by land and water, sanitary police supervision should be established on *the frontiers as well as on ships* For this purpose, on that quarter from which importation is threatened as for instance at custom houses, stations for examination provided with quarantine necessities and disinfecting appliances should be erected where the sick and suspects are detained and the infected luggage disinfected The travellers permitted to proceed must be watched during their journey and at their destination until the end of the period of incubation (ten days) Crowds of travellers such as emigrants and pilgrims whose hygienic conditions are usually unfavourable have to be submitted to a ten days quarantine

The sanitary police supervision of the *maritime commerce* has to extend to all ships—sea or river—coming from plague stricken harbours Ships which have or have had plague patients on board must go into quarantine, and the patients must be isolated in special quarantine hospitals, it is best to burn the linen and clothes of the patients, and the luggage of the healthy crew, passengers &c, as also the ship itself, must be disinfected Ships on board which no cases of plague have occurred during the voyage *are to be exempted from these measures*

The measures resolved on at the *Sanitary Conference* held in Venice in 1897 are of particular interest [illegible]
suspicious and unsuspic[illegible]
or on which one or mor[illegible]
days (2) Suspicious [illegible]

[illegible]

travellers &c are concerned for suspicious vessels as for plague stricken ships [illegible]

Attention should also be directed on ships to sick and dead *rats*, and as these animals are good swimmers the vessel should not be allowed to approach the quay or wharf Articles of food gnawed by rats, must be destroyed

A supervision of goods traffic has also to be undertaken but as goods in general have a relatively small chance of becoming infected no extensive measures likely to seriously affect commerce are necessary It suffices to exclude from commerce *such articles as can be infected by* plague patients from a plague stricken country The latest German prohibitions are quite adequate, only forbidding the importation from Asia

Egypt, &c, of body linen, old and worn articles of apparel, second hand bedding, and rags of all kinds.

Finally, *improvement of sanitary conditions* play a great part in the prophylaxis of plague, for, as seen above, the origin and development of

squills, &c

Personal prophylaxis consists in a regular manner of living, scrupulous cleanliness, and care of the skin, as also the avoidance of coming into contact with the plague stricken and their dwellings and effects Formerly the inunction of the body and more particularly of the face and hands with oil was recommended, a measure based on the observation that oil carriers, and oil and fat dealers, were seldom affected by plague, but experiments have failed to confirm this theory Valuable experiences on *protective inoculations* have been gathered these relating to so called active as well as to passive immunisation Active protective inoculation was practised by Haffkine, who used

month old, grown at a temperature

for an hour at 70° C Yersin used

immunised by being inoculated

Although experimental inoculations on animals with both methods yielded affirmative results, Haffkine's method only was successful in regard to human beings, who are much more susceptible to plague than the experimental animals used, so Yersin's method was given up. Even though Haffkine's protective method does not afford absolute immunity, yet numerous statistics published certainly prove that of persons inoculated relatively fewer fall ill and of those that do fall ill fewer die than in the case of the uninoculated According to Haffkine, the difference in mortality from plague between the inoculated and the uninoculated parts of a community was on an average 80 per cent, and the death rate as regards inoculated plague cases was 50 per cent lower than in the uninoculated The duration of protection is supposed to be at least four to six months

days

On the outbreak of an epidemic it would be practically impossible to inoculate the entire population so as a rule the inoculation is confined to the inmates of plague houses, and all those who, in consequence of their occupation, are particularly exposed to the dangers of contagion, such as doctors, attendants, persons engaged in handling or burying corpses, and persons occupied in the cleaning and disinfection of plague houses

TREATMENT.

The treatment of plague is symptomatic and Cantlie considers the

oxygen

In Bombay good results were attained by large doses of hydrar. perchlor, for which plague patients exhibit a peculiar tolerance Syphi

should be encouraged by hot drinks

sleeplessness were best relieved by hyoscine (0 006 subcutaneously) For vomiting, mustard poultices over the epigastrium, ice and morphia are used

The *buboes* and *carbuncles* are treated with fomentations of sublimate and warm poultices when there is fluctuation, an incision should be made Leumann warns against the too early incisions of buboes which have not yet suppurated, as in two such cases death rapidly followed Injections of carbolic acid, sublimate, or tincture of iodine into the glands have not proved efficacious Yamagiwa considers the early extirpation of glands rational as these represent the primary seat of the disease and by this treatment enormous numbers of the original plague infecting bacilli are removed, in two cases he saw favourable results follow the operation On the other hand, a case is communicated in the report of the German Commission in which death from plague meningitis followed the excision of the buboes

When *hæmorrhages* set in styptics, such as tinct ferri perchlorid, ergotin, &c, should be tried

In *pneumonic plague*, stimulants and expectorants are indicated The inhalation of a spray of 1 per cent carbolised lime solution may also be tried

The serum therapy which yielded such good results on animals, has not been
holds good with the serums of Yersin and Lustig
leo proteid
be possible

Jan 1 1898 p 40

to have a better effect
whereas the mortality

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II

DENGUE FEVER.

DEFINITION.

Dengue Fever is an acute infectious disease, distinguished by the appearance of an initial and terminal polymorphous eruption and accompanied by severe articular and muscular pains, dengue fever is confined for the most part to warm climates

SYNONYMS.

[illegible]

[illegible] Zulzer the name originates [illegible] *dandy* the illness taking its [illegible] ed According to Ornstein [illegible] by a sound ringing through [illegible] o v During it can be traced back to ancient Arabic and signifies great depression, languor

HISTORY.

[illegible] last few [illegible]

GEOGRAPHICAL DISTRIBUTION.

In EUROPE dengue fever has hitherto been observed in Southern
Grecian Archipelago, Crete,
r, Syria, Palestine, the coast
China, China (Hong Kong,
and in the Malayan Archi
in Egypt Tripoli (Benghasi),
anary Islands, Reunion and
ates of the United States, in
nduras the West Indies, in
Curaçao, on the northern coast of South America in New Granada, Peru (Lima, Callao) and Brazil finally in Tahita and the Sandwich Islands

It will be therefore seen that warm countries are particularly visited by this illness In a northerly direction the disease on the Eastern Hemisphere has penetrated to 41° (Constantinople), and on the Western

if these districts or any one of them should be regarded as the birthplace of dengue fever, and is thence periodically carried into other countries According to Zülzer, at least in regard to the more important epidemics, the point of departure of the disorder is generally the islands of Central America, particularly the lesser Antilles in the Western Hemisphere and the littoral of the Red Sea in the Eastern Hemisphere Besides these two, de Brun asserts that there is a third centre on the west coast of Africa, in Senegambia.

ETIOLOGY

Dengue fever is originated by a specific, but hitherto undiscovered virus of disease This is, however probably similar in its nature to the virus of acute exanthema, to which dengue fever is closely allied

Hunt (according to Hare) found very m [illegible] granules in the fresh blood of patients as also similar formations in bouillon into which the breath of a patient had been conducted Kartulis and other investigators were unable to confirm any micro organisms in the blood of their patients

Opinions as to the contagious nature of the disease are divided Whereas formerly it was mostly considered to be non infectious, at the present time, and especially after the experience of the last epidemics, the conviction as to its contagious character has gained more ground It has been frequently observed that the arrival of persons suffering with dengue fever, in localities hitherto healthy, has been immediately followed by the outbreak of epidemics, as in ports after the arrival of ships with sufferers

on board, and in the interior after the arrival of troops from infected garrisons In many instances it was easy to trace how epidemics occurred in the immediate vicinity of the first case of illness, and how from that point further foci developed and the illness progressed through families houses, streets, &c That dengue fever is contagious seems to be proved by the frequency with which doctors and nurses are attacked by it, and on the other hand this idea is negatived by the extraordinary rapidity with which the dengue epidemics are wont to spread In this connection it is, however, to be considered that the incubation period of dengue fever is a very short one, that patients, even from the commencement of the illness are capable of infecting others, and that once the illness has been imported, the virus of the disease can develop outside the human organism, clinging to the soil or elsewhere and multiplying · In these particulars dengue fever resembles influenza, and, in fact, exhibits so great a similarity to influenza that some few authors have even gone so far as to assert that the two are modified forms of the same primary disease (Hansen), or even declare them to be identical (Canthe, Pelkin) Influenza, also, which formerly was reckoned to be non contagious is, according to the experience of the pandemic of 1889 1890 now held by most observers to be infectious

The virus of dengue is readily diffused, so that a casual exposure suffices for the transmission of the illness Perhaps even the virus may be contained in the breath of the patients

The *period of incubation* has a maximum duration of not more than four or five days but it usually lasts one or two days only, often only a few hours

The virus of the illness can be *carried by means of human intercourse* By sea it follows the maritime commerce, and in the interior the principal streets, railways and rivers

Probably the virus of the illness can also be *carried by inanimate objects*

It is supposed that in 1889 dengue fever was carried to Smyrna through *rags* which are every year imported for sale from Palestine, Syria and Cyprus by Jewish rag merchants (Floras)

A *certain high temperature* is necessary for the inception and spread of an epidemic The summer and the commencement of autumn are the real dengue seasons especially in those districts that are not actually tropical, the illr[illegible]
in September an
the tropics also
least only then

when the temperature is relatively cooler as for instance was proved by the epidemic of 1827 1828 in the West Indies A great fall of temperature and the appearance of absolutely cold weather always puts an end to the epidemics (Hirsch)

The *moisture of the atmosphere* exercises no influence on the appearance of the illness Epidemics have come under observation during rainy, as well as during long spells of dry weather Winds also have no significance, but Corre ascribes *earthquakes* as exercising an influence on the illness

The physical and geological nature of the soil plays no part in the development or spread of the disorder As in yellow fever *coastal regions* and *towns* are most affected the illness is especially liable to appear in those parts of the town which are overcrowded and unfavourably situated as regards hygiene *Places at high altitude* consequently cooler, escape for the most part still in 1889 villages at an elevation of 1200 1500 mètres on Lebanon were visited by the illness (de Brun)

Immediately the importation of the illness has taken place, the spread of the epidemic as mentioned above is apt to follow rapidly The duration of the epidemic is generally several months and on the conclusion of the epidemic sporadic cases often occur weeks months or even years after, sometimes dengue fever takes permanent possession of places once visited by the illness a fact observed by de Brun in Egypt and Syria

On ships also epidemics frequently come under observation, especially on such as have come from infected ports sometimes however without an infection being traceable

Thus in 1870 dengue fever broke out on board a French man of war cruising on the West Coast of Africa in 0 21° south latitude and 2 24° west longitude without it having been possible that it could have been carried from land or from another ship (Fougue)

The *pre disposition* to dengue fever is a general one When a district is visited by the illness a large part of the population is apt to fall ill It s not a rare occurrence for two thirds three quarters or even a larger proportion to be attacked occasionally only a few escaping

Neither sex nor age affords immunity children only a few days old nd the most aged persons are attacked The illness has even been observed in newly born infants

Difference of *race* also plays no essential part True in a few idemics (Antilles, Java, Benghasi &c) the observation was made that negroes possessed a certain immunity in others (India China) that er Europeans than natives were attacked still in these instances uliarities of race come less under consideration than other circumces (possibility of exposure to infection &c)

Position and *occupation* have no influence No immunity is afforded previous attack of the illness Dengue fever not only attacks ns who have had the illness the year before but even attacks the individual again and again during the same epidemic Some ns seem to be particularly predisposed to dengue being attacked or several times in every epidemic

rue fever is said also to occur in animal (cow horses, dog and cats) in India America whole herd of cattle are attacked by the disease

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III.

YELLOW FEVER.

DEFINITION.

Yellow fever is an acute infectious disease peculiar to the warm countries of the Western Hemisphere It is clinically characterised by a typical course of fever, great prostration, the appearance of icterus and albuminuria, and tendency to hæmorrhage, anatomically the disease is characterised by an acute parenchymatous degeneration of the liver and kidneys and a fatty degeneration of the capillaries

SYNONYMS.

Gelbfieber, Yellow typhus Icteroid typhus, Black vomit, Fièvre jaune, Typhus amaril, Amarilisme, Typhus icterode Pestilence hémogastrique, Gele Koorts, Vomito negro Vomito prieto, Fiebre amarilla Febbre gialla, Febris flava Typhus icterodes, Febris ardens biliosa (*Tyne*)

HISTORY AND GEOGRAPHICAL DISTRIBUTION.

The earliest history of yellow fever is shrouded in mystery. It is [illegible] the disease first appeared The first positive [illegible] ng to Hirsch, dates from the middle [illegible] inated with Father Dutertre, who in [illegible] Antilles The Antilles are probably to be regarded as the *birth place* of yellow fever, and from thence in the [illegible]

according to [illegible]).

Within this wide area there is, however, a relatively small region in which the disease reigns endemically, that is to say, where probably sporadic cases of yellow fever constantly occur, and from which from time to time (occasionally after decades of free intervals) an epidemic develops, without the illness having been brought in from outside. Such endemic centres are the West Indian Islands, more particularly Cuba

na), a few spots on the coast of the Gulf of Mexico (Vera Cruz ado, Tlacotálpam, Laguna and Campêche) where yellow fever has ne established in consequence of having been repeatedly imported, il, particularly Rio de Janeiro, where this scourge has been endemic hirty years, and finally a part of the Coast of Guinea (Sierra Leone) last mentioned place has probably also been infected from the tilles, and *not* the reverse as stated by Pym, for the first reliable counts as to the existence of this disease there do not extend back rther than to the last twenty five years of the eighteenth century 1778)

Beyond these districts yellow fever occurs in the form of *epidemics* appearing periodically, and which can be traced back to having been carried in from its original home

In North America it has been observed in all ports on the Mexican Gulf Coast and on the Atlantic Coast as far north as Guayamas and on the Gulf of California The most virulent epidemic experienced in the United States during the last century was that of 1878 in which 132 towns were visited by this scourge and to which about 16 000 persons fell victims The latter epidemics confined to a few of the Southern States raged during the years 1897 1898 and 1899

In South America the geographical region of yellow fever extends to all the ports on the Mexican Gulf Coast and the Atlantic Coast south, as far as Monte Video and Buenos Ayres from whence it extends to the Paranas as far as Corrientos and Assuncion as also on the Pacific Coast from Mexico to Peru It is only, however since about 1660 that the disease has attained so wide a distribution In 1849 it was carried to Brazil and even to Bahia by the North American brig which came from New Orleans where the disease was raging During the following year yellow fever was carried to Rio de Janeiro and thence spread further along the coast and into the interior Later on yellow ever was spread from Brazil to Peru and to the States of Rio de la Plata In Rio de Janeiro it raged from 1850 to 1861 In 1861 it was gain imported to the same place from St Jago and since then has kept a firm footing there

Compared to the extensive region of distribution of yellow fever in the Western Hemisphere its occurrence in the Old World is very limited As above mentioned it was carried to Sierre Leone where it is now endemic and often appears epidemically north and south from this district on the West Coast of Africa and the West African Islands Slight outbreaks were in 1895 reported from the Gold Coast (Accr and Coast Castle), and in 1899 from the Toory Coast (Great Bassam In Cameroon according to F Plehn yellow fever has never bee observed On the North Coast of Africa the disease has only on been noted namely in 1804 on the Island of Alhuzemas off the coast Morocco whither it bad been carried from Catalonia

On the other hand the South West of Europe more particul the south west coasts of Spain and Portugal and Majorca have l repeatedly visited by yellow fever In Spain the first epidemic b out in Cadiz in 1700 and several followed during the course o eighteenth and at the commencement of the nineteenth century outbreaks spread over the greater portion of the coast and even of t terior Since 1821 Spain has experienced no severe epidemics, alt the disease has several times occurred in limited areas In P l w fever appeared in Lisbon for the first time in 1723 and a xtendin also to other towns, was observed in 18

Italy has only once had a transitory visit from yellow fever, and this was in 1804, in Livorno, where the disease had been carried from Cadiz

Although ships having yellow fever patients on board have often entered French and British ports, no spread of the illness has taken place in consequence, with the exception of three small epidemics, which broke out respectively in Brest (Brittany) in 1856, in St Nazaire (Brittany) in 1861, and in Swansea (Wales) in 1864 This scourge has never been observed in Asia and Australia

The epidemic appearance of the illness *on board ships* which have come from infected ports is of special importance

ETIOLOGY.

Yellow fever is caused by a *specific virus*, the nature of which is still unknown It is my opinion that, though many observers have found micro organisms in the blood, tissues and excreta of yellow fever patients and cadavers, and in spite of Sanarelli s *bacillus icteroides* which has called forth so much attention, the etiological factor of the disease has not yet been discovered

disease

Klebs in two cases of *yell* ... forms which he considers to be *protozoa* ... they were partly in the he... *vacuoles and deposits of fe*... which were mostly changed. These forms were also met with in the *stomach* and *duodenum* which, besides, contained forms of sporulation. Klebs regards *yellow fever as a gastro duodenitis, primarily originated by protozoa and which attacks the* liver, causing atrophy thereof, through the invasion by the parasites of that organ.

We do not know by what means the virus of the disease invades the ... certain that the transmission is not by means ... to spread than ... ing water is the ... with a universal water supply, one part may be spared while the other is attacked (Sternberg)

The *period of incubation* generally fluctuates between one and five days, the most frequent being between two and three days. The statement that, in rare cases, it may extend to several months, is to be regarded with grave doubts.

The virus of yellow fever does not seem to multiply in the diseased organism.

According to the present general opinion, the illness is not *contagious, it is not the yellow fever patient that infects but the yellow fever locality.* It has been observed times without number that patients taken to places free of yellow fever have never caused a single case of the illness, if the locality lacked the conditions necessary for the development of an epidemic.

... of the disease seems most particularly to cling to the *soil* ... se ... in ... is, healthy and sick, as also inanimate articles, such as clothes, &c., may serve as carriers of the virus of disease. Probably also insects (flies, mosquitoes) play a part in the dissemination of this disorder.

Further conclusions as to the qualities of the unknown virus of yellow fever may be formed from the general climatic and terrestrial conditions under which the illness appears

A *high temperature* is necessary for the developement of the virus of yellow fever The disease only rages throughout the whole year epidemically in tropical regions which at least have an average winter tem[illegible]

rain

20°

cool

has

(Hirsch) Once an epidemic has set in, it may continue at a low temperature, but a considerable fall of temperature always causes an abatement and frost the extermination of the scourge, this fact has frequently been observed on infected ships passing into colder latitudes It has been repeatedly noted that epidemics which had been extinguished when the temperature fell to freezing point, revived in the following year without any fresh importations of the illness having taken place, this occurred in Cadiz 1800 1801, in Malaga 1808 1809, and in Memphis 1878 1879 On board ship also it is possible that epidemics obliterated in consequence of frost, broke out anew as soon as the ship came under such climatic conditions as favoured the development of the virus, so that sometimes one importation of the disease on a vessel suffices to infect it for a long period

A second, but less important factor in the etiology of yellow fever is formed by *atmospheric moisture* and *depression* the virus requiring [illegible]

in consequence of their position have a maritime commerce

The disease makes its appearance first in those parts of the town adjacent to the harbour and docks, where the sailors and dock labourers, and the newly arrived foreigners, congregate, and which are mostly distinguished by their unhygienic conditions, caused by agglomerations of decaying organic matter which forms a favourable nutritive soil for disease germs. Single spots, single houses, flats or single streets are always the foci of the disease, the neighbourhood being quite exempt In Rio de Janeiro, which is severely afflicted with yellow fever, foreigners, though not acclimatised, are not often seized, for during the fever period they live at Petropolis, which is hygienically situated at an altitude of 800 metres, they only go to Rio during the day, and even then are mostly in the open air Smaller towns and villages in the interior are but seldom visited by the disease

Yellow fever essentially does not spread beyond the limits of maritime

commerce, the illness mostly reaches its limit where this medium of transmission fails" Still other circumstances, such as the low temperature of mountains, may be taken into account

On board *ships*, especially wooden ones, in which the walls utensils, ballast, and above all, putrid bilge water, may be the carriers of the virus of disease, certain parts, such as a particular cabin, deck, or side, may by predilection be infected by the disease Want of cleanliness plays a large part in the development of ship epidemics, but only such ships are attacked as have had direct or indirect communication with other infected ships, or with an infected shore

In countries where yellow fever is endemic, the virus of disease, during the epidemic free season is probably kept alive by a sequence of isolated cases Outside the endemic home of the disease in order to cause an epidemic outbreak in a place, or on a ship the following conditions, as stated above, must have co operated (1) Importation of the virus of
nditions
ological

of the
epidemic, a period varying from a few days to many weeks may elapse the epidemic never sets in suddenly, it is always introduced by a series of single cases of illness, it is only subsequent to such illnesses having existed for a longer or shorter time (four to eight weeks or more) that the epidemic usually quickly reaches its height The first cases as a rule
The
the
ends
n in
May
and
August are the hottest months in New Orleans The duration of the epidemics varies exceedingly, extending from a few weeks to several years During the period remissions may alternate with exacerbations these being caused by the influence of the weather or the movements of the population *The extinction of the epidemic may take place gradually*, or it may occur suddenly, the weather having an influence on the disappearance of the disease

Amongst a population attacked by an epidemic of yellow fever, there is a varying predisposition to the illness of which the following factors

Mongolian races also seem to possess a certain immunity, this, however, is not the case with the American Indians (Red skins) and the Hindoos The *whites* run the greatest risks, the half castes less decreasing as there is less white blood in their veins Those born in higher latitudes are more susceptible than those born in tropical or subtropical regions Of Europeans, therefore, the Russians, Swedes, British and Germans run far *more* risk of infection than the French, Italians and Spanish

(2) *Acclimatisation* —The susceptibility of whites who have emigrated

second attack of yellow fever is of exceedingly rare occurrence In the

would follow more quickly than in the case of a new arrival

The relative immunity of *creoles* is partly a consequence of acclimatisation and partly rests on the fact that creoles during childhood especially the latter period thereof have at epidemic times gone through more or less serious attacks of fever which are to be regarded as mild attacks of yellow fever (Lota) Creoles who have been sent to Europe for their education are on their return as susceptible as if they had been born in Europe

considerably (Hansen)

(3) *Sex* —The female sex is less liable to this disease than the male and on an average the mortality is less The probable reason for this is that women and children are less exposed to the danger of the disease than men

(4) *Age* —Yellow fever seldom occurs in children and the aged The period between 10 and 30 years is the most liable

(5) *Constitution* —Strong persons are more predisposed to the illness than the weak and anæmic

(6) *Environment* —Persons living in insanitary environments are more liable to contract yellow fever than those better situated

As regards occupation labourers and sailors are most affected According to Hanisch those whose business brings them into contact with fire such as cooks bakers sugar refiners locksmiths blacksmiths are most liable to be attacked while those whose occupations tend to the inhalation of unwholesome air such as tanners leather workers soap boilers tallow chandlers street sweepers &c show less tendency to the illness According to Souza Lima cigar and cigarette makers seem to enjoy a certain immunity

Infection by yellow fever seems to take place principally *at night*

n but pass the
the disease in

n chills bodily
d ly exhaustion

caused by tropical heat especially if accompanied by much bodily exertion sleeping in the night air debauches indigestion exaggerated terror sorrow &c

Yellow fever can also occur in animals especially dogs and poultry more particularly those that have been imported from Europe

SYMPTOMATOLOGY

Occasionally the outbreak of the actual illness is preceded by *prodromal symptoms* consisting of general languor, headaches, giddiness, pains in the limbs bodily stiffness, loss of appetite, belching, constipation and a dry skin In most cases however, the *onset of the illness* is *sudden*, [illegible] it, or a severe rigor [illegible] ing heat [illegible] occurs during the night The patients immediately feel seriously ill, and become quite dejected A feverish restlessness develops causing the patients to incessantly change their position and toss about in bed There is but little sleep and it is disturbed by terrifying dreams

The patients complain of *vertigo* and severe *headaches*, particularly in the frontal and supraorbital regions Pains in the loins (coup de barre) extend to the back pelvis and legs the lumbar pains are associated with a sensation of weight and dragging in the testicles

The temperature rises and after a few hours averages 39° C or more The pulse is frequent and mostly small the respiration accelerated and superficial The skin in serious cases feels dry and burning hot but in milder cases there is a tendency to sweat

The *face* is much reddened and swollen The eyes ache and stream with tears the conjunctivæ are severely injected and sometimes there is photophobia In severe cases the eyes shine in a peculiar manner and the gaze is staring Frequently herpes appears round the mouth and nose

[illegible]

The tongue is moist and swollen, red at the edges and with a white or yellowish coating down the centre During the further course of the illness it often becomes dry and the coating assumes a dirty brown appearance The mucous membrane of the palate is much reddened and swollen The gums also become spongy and exhibit a tendency to bleed

The appetite is quite gone There is intense thirst a *feeling of oppression* and great sensitiveness in the *region* of the stomach Frequently pulsation in the epigastrium can be made out Occasionally *everything that has been eaten is at once vomited* The *vomit is almost* always sour, and sometimes it is mingled with bile The bowels are constipated for the most part, but occasionally the evacuations are *loose*

The *urine* is diminished its specific gravity increased and its reaction almost always acid The excretion of urea is considerably diminished and to a less degree the uric acid also Cunisset, in serious cases only found 1 o gr uric acid (and still less) to the litre Often, even at the beginning of the illness traces of albumen are perceptible According to Ruiz, Casabo and Cabello the urine is supposed always, even during the

first few days of illness, to contain mucin. In serious cases, sometimes even from the commencement of the illness, there is more or less complete ... sent, so that ... this disease, ... y, the patient exhales a peculiar putrid odour Stone and Woodville (1844) assert that they occasionally observed this smell even fourteen days previous to the outbreak of the illness This odour is considered an untoward sign

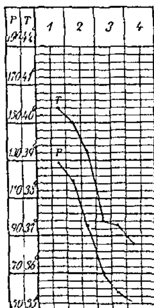


FIG 7 —Yellow fever Mild case Recovery

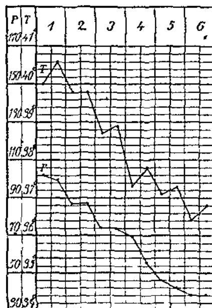


FIG 8.—Yellow fever Mild case. Recovery

During the two or three days following the invasion period an increase of all the symptoms takes place The temperature in about twenty four to thirty six hours reaches its maximum, 40 41° C, only remaining so high for a very short time and then slowly or quickly falls, the fall being only interrupted by evening exacerbations In rare cases very much higher temperatures occur The highest temperature observed by Thornton was 42 2° C, by Nogeli 42 5 C and by La Roche 43 3 C

In mild cases the temperature rarely rises to 40° and the maximum is usually attained on the first day

The fever usually lasts ... Death may occur during the firs... n a rapid rise of temperature ... so that very high *post mort*... ord

(Sternberg) Roux in one case, shortly before death observed 49 5° The pulse during the first stage is accelerated, full and hard The frequency usually averages 100 1
the temperature is remarkable
be quite pathognomic During
excepting slight variations, constantly decreases even when the temperature rises In mild cases, the temperature and pulse frequency fall in unison Compare the accompanying charts taken from Touâtre's work (figs 7 11)

Towards the end of the first period of the disease, or frequently only later, *jaundice* sets in The sclerotics and the skin, more especially of the face neck, and upper parts of the trunk, assume a hue which may

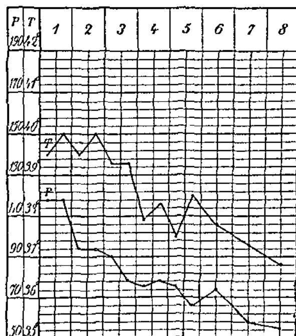


FIG 9 —Yellow fever Case of medium severity Recovery

exhibit every shade from light yellow to dark orange, mahogany, or bronze colour Biliary pigment is sometimes to be demonstrated in the urine, bile acids, on the other hand are, as a rule, lacking The fæces retain their biliary colouring and only quite exceptionally assume a pipe clay appearance The jaundice continues until convalescence sets in
or three days, exhibit no
ptible on the pale skin of
increases after death
abatement of nearly all the
the first *stage of fever* into
the *second*—the *stage of rest* The temperature sinks and may become normal The pulse becomes full and soft and its frequency decreases The number of beats may fall to 40 or even 30 per minute The skin

becomes cool and moist The pains in the head and limbs abate The

second stage is immediately succeeded by convalescence the temperature

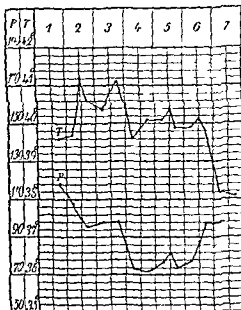


Fig 10 —Yellow fever Severe case Death

if not already normal gradually falls and the other symptoms disappear quickly, so that the patient, after only a week, can resume his usual occupation

More frequently, however a change of all the symptoms for the worse sets in after the seeming improvement and the illness passes over into the *third stage* or *stage of collapse* The temperature again rises, though not so quickly as at the beginning of the illness The type of fever is more or less remittent Sometimes the temperature sinks below normal but this is an ominous sign The pulse is sometimes accelerated sometimes slackened and usually small and threadlike Consciousness is mostly maintained but hardness of hearing or deafness great apathy and prostration are present More rarely furious delirium sets in the

features are pinched and distorted and the jaundice becomes very pronounced

The patients again complain of pressure and intense burning in the region of the stomach The *vomiting* which had abated again becomes more violent, or if none had existed previously, it now supervenes At first watery material is vomited, later, in consequence of being mixed with blood, small blackish streaks are seen, and at last the vomit may assume a coffee ground like or quite black appearance This is the much dreaded *black vomit* (vomito negro, Schwarz brechen) which is considered a very unfavourable symptom, which, however, is not a constant symptom of yellow fever It seldom appears before the third, usually on the fourth or fifth day It is always a dangerous though not an absolutely fatal symptom The vomiting of red blood, which is sometimes observed, is more to be feared

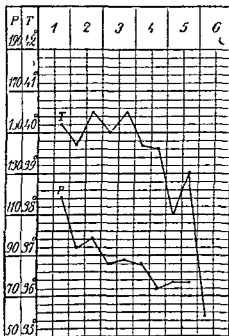


Fig 11 —Yellow fever Serious case Death

[illegible] less and shows [illegible] reaction

[illegible] more or less loose In fatal case [illegible] incidentally pure [illegible] ent collapse sets [illegible] olera is met with. Frequently complete *anuria* is present

Besides the hæmorrhages from the intestine and stomach mentioned above, many *hæmorrhages* in other organs occur, most frequently from the nose or mouth, beneath the skin and into the muscles, more rarely the respiratory organs, the uterus, vagina kidneys, bladder, urethra (if urethritis be present), eyes and ears are the seat of hæmorrhages Preg nant women usually, it may be said always during the first six months, *miscarry* (Nögeli) and few recover

Jones, in two cases of miscarriage found the fœtus—one of four months, the other five to six months—also affected with yellow fever

Death most frequently ensues in this stage, generally between the fourth and tenth day of disease Consciousness may be maintained until the last moment but most patients sink into a profound stupor Often singultus sighing and convulsive respiration Cheyne Stokes phenomenon of respiration and fibrillary muscular twitchings, precede death If previously high, the temperature also sinks sometimes even to 38° In rare cases death sets in suddenly during violent delirium or occasionally during convulsions

Should the disease end in *recovery*, an occurrence which seldom takes place in advanced cases a rapid fall of temperature often occurs accom panied by profuse perspiration all the symptoms abate and gradually disappear Convalescence is always protracted and drags on for several weeks Sensitiveness of the stomach to all indigestible foods is especially apt to remain

Occasionally convalescence is still further prolonged by secondary *complications* added to the original illness Such are suppurative par otitis buboes, abscesses boils cutaneous gangrenous inflammations ulcerations of the scrotum, gangrene of the toes, hepatitis diarrhœa, &c

Relapses are, as a rule rare in yellow fever they are more frequent in some epidemics than in others They mostly set in during the first period of convalescence, sometimes two to four weeks after the disappearance of the fever (Sternberg) Relapses are often induced by excesses especially indulging in copious drinks an error easy to succumb to as during convalescence great thirst is usual

Besides the *perfectly typical cases* on which the above description of the illness is founded, and which as we have seen are again according to their course divided into *severe* and *mild* other forms occur These con stitute the so called *abortive cases* such as generally also occur in other infectious diseases In these cases there is no development at all either of icterus or hæmorrhages After a stage of fever lasting a few days perspiration and copious secretion of urine set in and all symptoms rapidly abate In other forms there may be an indication of icterus [illegible] ner symptoms [illegible] of the pulse [illegible] occurs (Grie [illegible] languid have [illegible] stomach con stipation and lumbago These symptoms last for about a week and gradually decrease, or during the course of an apparently trivial disorder an attack of vomiting of blood, followed by rapid collapse and death, may result

On the other hand, cases are observed which are distinguished by a *foudroyant* course, and may cause death within the first thirty six hours

Apart from the severity of the cases there is no justification for dis

tinguishing various forms of yellow fever The differences exhibited b the separate aspects of the disease are only caused by differences of degree or individual peculiarities and complications

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Yellow fever runs the same course in all countries, but the severity o particular epidemics is very different

The percentage of *mortality* varies extraordinarily in the different epidemics

Of the above mentioned thirty three epidemics in New Orleans, the mildest was that of 1897, the severest that of 1853, in the former the mortality averaged ½ per cent, in the latter 85 per cent In Sene gambia Roux even observed a mortality of 94 per cent (of course the hospital conditions were bad) In this respect also the various periods of one and the same epidemic differ Some epidemics begin with mild cases, and are followed by cases of great severity In other epidemics the reverse is the case Occasionally, during an epidemic, separate localities and streets of a town exhibit a remarkable malignancy of the fever Finally, the mortality amongst the different classes of the population is unequal whereas amongst the natives 7 to 10 per cent is the average, the mortality may rise to from 20 to 80 per cent amongst the non acclimatised whites

Death is most frequently caused by uræmia and cholæmia more rarely by hyperpyrexia, abundant hæmorrhages, and insufficient hæma tosis

PATHOLOGICAL ANATOMY.

In yellow fever cadavers the rigor mortis usually sets in early and is very pronounced, and the same is the case as regards *post mortem* staining

As a rule there is both cutaneous and *internal icterus* in varying degrees The skin is, besides, occasionally the seat of petechiæ, or even ecchymoses, miliary spots, pustules, scarlet fever like, or erysipelatous inflammations boils carbuncles, ulcers, or gangrene, emaciation is mostly inconsiderable hæmorrhages of different sizes are occasionally found in the muscles

The *brain* and *cerebral meninges* are frequently hyperæmic, and more or less effusion is present in the ventricles and subarachnoid space, the effusion is sometimes turbid and of a yellow colour The surface

The blood is generally dark and fluid in the cadaver. Sometimes it has an acid reaction, sometimes it develops much ammonia. Its urea according to Chassaniol and Cunisset, is increased. During the first period of disease the latter found 0 18–0 23 gr, and after death 0 17–0 51 gr in 1,000 gr standard, which, however, lie within the physiological limits[1]. In the second and third stage of the disease the blood contains biliary pigment. The red blood corpuscles are considerably diminished, and the white still more so. Sternberg, besides, observed very shiny granules which he considers to be fat, resulting f[illegible]

[illegible] hæmorrhagic infarcts, ecchymoses beneath the pleura, and, in rare cases, larger serous effusions into the pleural cavity are found.

The *stomach and intestine* contain larger or smaller masses of black, thick or thin fluid, often tar like, blood. The *mucous membrane of the stomach*, as a rule, exhibits the signs of acute catarrh with ecchymoses. Hæmorrhagic erosions are often found but very seldom ulcers. In the œsophagus also erosions often occur, being probably a consequence of the corrosive condition of the vomit.

The mucous [illegible] state of catarrh, and [illegible] ting of mucus, swelling [illegible] occasionally also ext[illegible] The [illegible]

[illegible] astric and [illegible] eneration, [illegible] areas are found between the glandular ducts, which can be traced to the surface. The epithelium is destroyed and transformed into finely granulated *debris* in the parts that are more or less diseased.

[illegible]

branches of the portal vein and is accompanied by œdema of the intralobular connective tissue. In drunkards the nutmeg liver is often met with.

[illegible] shows them to be the seat [illegible] e glands had almost dis[illegible] changes are not extant [illegible] rstitial tissue was included [illegible] ar capillaries were much dilated, and in parts almost varicose.

According to Pellarin the hepatic tissue has lost its normal acid reaction and is very poor in glucose and sugar, the bile is slightly alkaline.

The *gall bladder* contains dark, thick, viscid bile or perhaps only a little mucus, or blood. The mucous membrane of the same is more severely injected and occasionally exhibits punctiform ecchymoses. The *biliary passages* are almost always free and permeable.

[1] Hoppe Seyler, Physiologische Chemie 1881, p 431

The *spleen*, in the majority of cases exhibits no changes sometimes it is a little enlarged hyperæmic and soft

The *kidneys* are somewhat enlarged and congested Frequently small hæmorrhages are encountered beneath the capsule and in the cortical substance which is sometimes enlarged cloudy and of a greyish white colour Microscopic examination shows turbid swelling fatty degeneration and desquamation of the renal epithelium as also a more or less distinct obliteration of the malpighian bodies, entire tubules often without epithelium are found filled and stopped up in places with different kinds of casts especially of the granular variety Babes also observed fresh interstitial changes

The *pelvis of the kidneys* exhibits catarrh and ecchymoses the same being often the case with the *bladder* The latter is almost always contracted and empty

We must conclude that the yellow fever virus exercises its deleterious effect principally on the liver kidneys and capillaries The diseased hepatic cells lose their capacity for retaining the bile formed in them and in consequence the bile
thus ensues (Liebermeister s
softness of the pulse in the se
to these whilst the sympto
partly to cholæmic partly t
the various organs are expl
caused by fatty degeneration

DIAGNOSIS

No difficulties are presented in the diagnosis of yellow fever when it is a question of well marked cases occurring during an epidemic and within the more narrow regions of its home The same cannot however be said in regard to isolated cases taking place beyond yellow fever limits
icterus gravis which clinically
lly may present an appearance
n remarkably difficult or quite

the possible etiological factor *during a decided epidemic is the sole distinctive guide*

The symptoms of yellow fever which should most particularly be taken into consideration for diagnostic purposes are *the sudden commence*

Deutsche med Wochenschr 1893 No 16 p 365

Touatre lays great weight on the condition of the pulse during the three first days of disease (see above, p 60), and for this reason it is necessary to narrowly watch the commencement of the illness. By carefully considering this symptom one will be in a position to avoid mistaking yellow fever for certain types of *malarial fevers* (*bilious remittent* and *blackwater fever*) as also for bilious *typhoid*, which present many symptoms in common with yellow fever

for dengue fever For the differential diagnosis of these two diseases the clinical symptoms should be especially taken into account, in yellow fever the pains are in the head and back, in dengue fever in the joints and muscles, vomiting frequent in the former, rare in the latter illness,

illness

PROGNOSIS

Yellow fever is always a serious illness, even seemingly mild cases sometimes quite unexpectedly assuming a severe aspect The prognosis depends, first and foremost, on the severity of the epidemic, which may vary greatly in intensity

The prognosis is generally more favourable in the case of women and children th
and in dri
food, &c
measles, e
ance as in the case of adults

The *degree of the initial fever and the condition of the urine* are of great importance in prognosis If the temperature rises to above 41° there is imminent danger to life Should it rise to 42, or even 43°, the fatal

ysed 260 cases and found that
above 41° death occurred It
exceeded during the first two
sign if no remission, or only
or fourth day of disease It is

a bad prognosis if there is great decrease or entire suppression of the secretion of urine, a large quantity of albumen in the urine is likewise a bad sign

Severe and protracted injection of the eyes, the early appearance of icterus, severe stomachic disorders and frequent vomiting, the appearance of black or red vomit (in the latter death is almost certain)—all these are *unfavourable signs*, as also are hæmorrhages from the intestine, or into other parts, especially if connected with algide evacuations (always excepting slight bleeding from the nose at the commencement of the illness, which is considered benign), the appearance of delirium, singultus and sighing respiration

PROPHYLAXIS

The prophylaxis of yellow fever is divided into *general* and *persona* prophylaxis

General prophylaxis consists partly in preventing the increase o sporadic cases and the occurrence of epidemics in those particula countries in which yellow fever is endemic, and partly in taking measure to avoid the disease being carried into ports exposed to the dange thereof

As to the former it is to be effected by *improving the hygienic con ditions* by removing heaps of decayed organic matter by thoroughly cleaning the streets and having the dwellings kept clean, in order that the virus of yellow fever be deprived of a soil suitable for its development The same measures should be taken in towns exposed to the danger o the illness being imported On board ships epidemics of this disease should be prevented by cleanliness and good ventilation

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fixed law that all ships hailing from Central and
spected to be yellow
d in certain quaran
In these stations the
lowed to enter other

Patients should be isolated in *quarantine hospitals* and their *soiled linen* and *clothes* should be *disinfected* as should also the *ship* itself and the clothes worn by the healthy crew and passengers Ships that have had communication with infected ports or ships, but that after a subsequent long voyage have had no case of illness on board need not be quarantined

seaport town the centre of
ible by the *isolation of the*
ngs by *compulsory reporting*
of every case of the illness and by *strict house to house inspection* for the discovery of cases that might possibly be hidden

Although it has not been proved that the evacuations (urine fæces vomit) of patients contain the virus of yellow fever, it is advisable to disinfect these likewise

In order to prevent the illness being carried further into the interior a land quarantine must be established The measures taken by the United States, as described by Cochran, may well serve as a model After the appearance of yellow fever in a seaport town every regular connection with the infected spot during the period of the epidemic is closed Neither persons nor goods may leave the district except in special trains and under special supervision The regular passenger and goods trains are not allowed to stop at or near the infected town, so that nothing infectious can be put on them The particular trains which carry all the persons who wish to leave the infected town start as often

as circumstances require, and convey the refugees to such places beyond the yellow fever zone as are inclined to receive them The trains of the refugees are only permitted to stop at small stations to obtain necessaries, such as water, fuel and food Those refugees who have come from infected localities and have been exposed to the danger of contagion are obliged to betake themselves to certain "camps of probation,' where they have to undergo a ten days' quarantine, and where their luggage is disinfected[1] Those persons remaining behind in the infected town under the shadow of the scourge, are likewise provided with necessary stores by special trains Of course it is understood that already with the first

above the ground, excesses of all kinds, especially of drink, should be avoided, one should be protected from the sun during the heat of the day, and take care to avoid chills after bodily exertions and keep the bowels open; in fact, one should avoid all injurious habits which according to practical experience act as predisposing causes (see above p 57)

Domingo Freire, in Brazil, and Carmona y Valle, in Mexico, have recommended and carried out *protective inoculations*, the former with weakened cultures of his cryptococcus xanthogenicus, the latter with the residue of the urine of yellow fever patients, these, however, proved of no value, being based on erroneous principles (see above, p 52)

TREATMENT.

The treatment of yellow fever is *symptomatic* hitherto no specific remedy for the disease has been discovered

At the beginning of the illness an aperient is given, either calomel or castor oil Of the former 0 5—1 0 is given for a dose, of the latter 30—60 0 Rush advises calomel mixed with jalap (aa 0 7) Roux recommends sulphate of soda or magnesia with senna If necessary the alteratives are several times repeated during the course of the illness Touatre advises the use of two enemas daily, consisting of warm water, with sulphate of soda or magnesia one teaspoonful to half a pint

A *diaphoretic treatment* is also recommended at the commencement Hot footbaths containing plenty of mustard are given, whilst the patient, with his chair and bath, are wrapped in a blanket from head to foot. This may be repeated several times during the first twenty four hours

[1] *Veröffentl. d. Kaiserl. Gesundheitsamtes*, 1891, No 37, p 691

Priessnitz's packs are also applied, while hot tea is imbibed. Baths as hot as can be borne are ordered, the patient being subsequently wrapped in blankets for several hours

The *fever* is most successfully combated by *hydropathic methods*, such as cold water bandages or ice bags on the head, repeated cold sponging of the upper part of the body or of the whole body, cold packs tepid or cold baths Da Silva Ramos *recommends very short cold baths*, the patients are immersed for a few moments in a full length bath filled with water of

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an) an *alkaline* treatment of the illness in all its stages As early as 1867 bicarbonate of soda was recommended by Stone Sternberg adds sub limate *to the same (soda bicarb 10 0, hydrarg perchlor 3 02, aq 1000 0* of this 50 0 [three tablespoonsful] are to be taken every hour ice cold) This formula is known as "*the Sternberg* treatment"

By this treatment Sternberg reports that of 301 whites thus treated only 7 3 per cent died and amongst 73 blacks attacked there were no deaths

Touatre who is opposed to the administration of any drugs internally in yellow fever, advises that copious draughts of alkaline *Vichy water*, if necessary ice cold should be drunk

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To relieve the *lumbar pains* dry cupping, sinapisms and blisters are used, sinapisms and blisters are also used to allay the *vomiting*, as also hot poultices in the region of the stomach (Corre) For the same purpose small pieces of ice may be swallowed, and morphia, especially subcu taneously, chloroform (a few drops on sugar) and cocaine are used Blair sounds a note of warning against large doses of morphia as he has observed bad consequences even after 0 006 Thorington gives 0 02 cocaine ten to fifteen minutes before drink is taken, and if the vomiting does not cease he gives half the quantity every hour until it abates

When *blood is vomited*, i e, *black vomit*, bits of ice should be given to swallow, an ice bag applied over the region of the stomach, and styptics, such as liquor ferri perchlor (15 0 to 1000 0 water and sweetened with sugar, a tablespoonful every hour), ergot ergotin, acetate of lead with *opium*, may also be tried The latter should also be given for other

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When the skin is hard and dry and the urine scanty, and lumbar pains are present, Sternberg prescribes pilocarpin subcutaneously.

The *nourishment* of the patient is of particular importance During the first days this should be confined to liquids, such as milk (under some circumstances buttermilk and sour milk) and broth When the stomach is very sensitive limewater (one tablespoonful to a cupful) should be added to the milk When there is severe vomiting, iced milk, iced champagne or brandy (one teaspoonful every half hour) should be given If even these cannot be retained nutritive enemata must be resorted to. As soon as the stomach can again retain food, a light digestive diet should be given to the patient Errors in diet must be strictly avoided.

by an increase of the secretion of urine, and often by actual polyuria

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the Danube, and on the coast of the Red Sea (Suakim, Massowa), but it is probably also widely distributed over the tropical and sub tropical countries of the East, where it is still confused with typhoid, remittent malarial fever and continued fever, or has even been called typho-malaria Buchanan describes a form of fever occurring in Indian jails which exhibits great similarity to Mediterranean fever Wright and Smith by means of the serum diagnosis practised on soldiers who had returned home, were able to substantiate the occurrence of the illness in northern India It is probably also endemic in China (Hong Kong) and America (Puerto Rico)

The form of fever described by Buchanan appears during the ' unhealthy season The fever is not high may be continuous remittent or even intermittent and lasts ten to fourteen days An afebrile interval of about an equal period follows then fever again for a week or longer Three or four relapses are not unusual so that the illness lasts ninety or even one hundred and twenty days The illness runs its course almost without definite symptoms the spleen being only occasionally enlarged The appetite remains good for weeks and the bodily weight does not diminish quickly Buchanan has never found malaria parasites in this illness

ETIOLOGY.

Mediterranean fever was formerly regarded as a peculiar form of typhoid (Wood Borelli) or as a combination of typhoid and malaria (Maclean, Notter, Milnes) It is only lately that it has been recognised as a specific disease, especially after Bruce succeeded in Malta, in 1887 in demonstrating a certain *micro organism* which may be looked upon as the genesis of the illness The micro organism referred to is a very small round, or nearly oval micrococcus of about $\frac{1}{3}$ μ diameter, and which is often seen united in couples, and sometimes in chains of four It is possessed of no spontaneous movement and can be readily stained with gentian violet and methylene violet, but not by Gram s method It is contained in the *spleen* and *liver* in great numbers, probably also in other

micrococcus was confirmed by
fever with a fatal termination
and the disease can be trans

Gordon observed spontaneous movement of the micrococcus melitensis and by

peripheries bluish white, in a reflecting light they appear milk white throughout. Their growth is very slow, even after a couple of months they are not larger than hemp seeds

On *gelatine*, the micrococcus at 22° shows but a slight growth without liquefying the gelatine

No growth takes place on *potatoes* at the temperature of the body

Mediterranean fever is *not contagious* The introduction of the virus takes place by way of the air passages or intestinal canal it is probably

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greatest number of cases, according to Hughes, occur between May and the middle of October, the fewest between November and April

Unfavourable hygienic conditions, especially contamination of the soil by human excrement, seem to play an important part in the development of the disorder The etiological factor of disease is probably evacuated

Knights of Malta, which were always overcrowded and unhealthy, it also

r The author attributes

our water, which is used

become less frequent

bodily and mental exertions, excesses, &c, may be quoted

Immunity is acquired by having once gone through the illness The immunity is, however, not always absolute but may be again lost after some time (*Hughes*)

SYMPTOMATOLOGY.

The illness begins with the usual symptoms of fever: loss of appetite, indisposition, rigor, headaches, mostly localised in the forehead, moreover, pains in the limbs and loins, and sleeplessness The tem

perature rises gradually, and generally attains its maximum after several days The face in severe cases is reddened, the *patient looks excited* and complains of tinnitus aurium Sometimes nose bleeding occurs at the onset of the illness The tongue is at first swollen and thickly coated, and in severe cases it becomes dry and fissured and bleeds readily during the further course of the illness, the gums become relaxed bleed easily, and are in a scorbutic condition The pharynx has frequently a reddened appearance, and is occasionally ulcerated The tonsils are often enlarged With these symptoms there is loss of appetite, nausea occasional vomiting and a feeling of oppression and sensitiveness in the *region of the stomach The bowels, as a rule, are constipated* Occasionally mostly after errors in diet diarrhœa sets in, with or without pain in the cæcal region The evacuations are dark and of offensive odour, and sometimes are of similar consistence to those occurring in typhoid The stools at times exhibit a mucous and bloody composition Occasionally the abdomen is distended with wind, causing gurgling in the cæcal region The spleen is enlarged, as also the liver to a less degree and both organs may be sensitive to pressure Sometimes there is slight icterus, and nearly always more or less severe bronchitis, often accom*panied by expectoration streaked with blood* In rare cases pneumonia is observed, which according to Notter, always has its seat on the left side and is accompanied by pleurisy As a rule the patients complain of palpitation in the region of the heart Generally there is great it may even be said profuse, secretion of sweat, which mostly sets in about 1 or 2 in the morning and in consequence sudamina always form more or less, the illness has in consequence been designated *febris sudoralis* A skin rash has never come under observation Consciousness is generally maintained, but sometimes during the nights especially, slight delirium *sets in*

After from one to three weeks all the symptoms abate, the temperature gradually falls, and the patient considers himself convalescent This improvement, however, is not maintained After a few days a relapse sets in, the temperature again rises, the former disorders recur and weakness apathy and emaciation increase, while the complexion assumes a pale, clay coloured hue

During the further course of the illness *rheumatoid articular affections* are observed, according to Bruce, in about half the cases One or more *joints become painful and swell, and the skin over the joint* is reddened According to the same author the shoulder, knee, and hip joints are most frequently attacked, but sometimes all the joints are affected Painful swellings also of the bursæ and of the periosteum are observed In gouty subjects the beginning of the illness may be accompanied by a typical attack of gout

any part of the body, but sciatica is

orchitis—generally one sided—sets in,

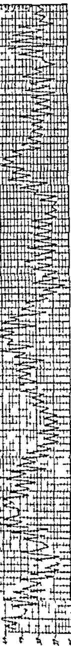
and

the

atrophy of single muscles, such as the deltoid, the flexors of the &c, with the tendon reflexes maintained or even increased Moreover, hardness of hearing sometimes occurs

In later stages of the disease skin eruptions are not uncommon, such as erythema, eczema, erythema nodosum (Notter) Occasionally also purpura accompanies the hæmorrhages above mentioned (bleeding

ose hæmorrhage from the gums hæmoptysis) At about the
eek desquamation of the skin especially from the soles of the
feet ...



view of the presence of profuse night sweats, Mediterranean fever may be mistaken for phthisis The older authors used frequently to mention *Med terranean phthisis* and state that it usually

illness Periods of fever lasting several days or weeks are followed by periods of days or months during which the temperature is normal or more frequently only a little above normal (½ to 1°) then again periods of fever set in and thus the disease may drag on weeks and months according to Bruce it may even continue for two years Hughes gives ninety days as the average stay of the patients in hospital As the illness goes on the length and intensity of the periods of fever diminish the fever being apt in the earlier stages to exhibit a continuous and in the later stages a remittent type Compare the temperature chart taken from Hughes mono graph (fig 12)

On account of the marked undulations ex hibited by the charts in Mediterranean fever Hughes has appropriately called the illness *Undulant fever* It however may also happen that the fever continues for months without in terruption during which period temperatures of 40 5° 41 0 and even higher are observed

In most cases Mediterranean fever has a favourable termination The fever gradually diminishes and no new relapses set in

A long time however elapses before the exhausted sufferers recover and for months after the illness there is a tendency to neuralgia and articular and scrotal swellings with slight fever Young and much enfeebled persons sometimes develop pulmonary phthisis or other severe affections of the respiratory organs subsequent to their recovery from Mediterranean fever (Maclean)

A fatal issue mostly occurs during the first four to six weeks and is usually caused by hyperpyrexia Shortly before death a consider

able rise of temperature sets in (43°, 44° and higher) and may be maintained even after death In other cases the fatal termination may be the consequence of complications such as pneumonia endocarditis, or excessive anæmia MacLeod communicates a case in which early in convalescence, purpura hæmorrhagica sets in (cutaneous hæmorrhages, bleeding from the nose mouth and urinary bladder) and death rapidly ensued

Hughes distinguishes three *types of the disease* —

(1) The *undulant* which is characterised by the undulations of temperature as described

(2) The *malignant* in which a typhoid state rapidly develops death occurring usually between the fifth and twenty first days through hyperpyrexia cardiac weakness, or

The *percentage of mortality* is given by Hughes as a little over 2 per cent In Malta the illness has gradually diminished during the last decades During the sixties it still averaged 3 08 per cent, in the seventies 2 6 per cent, and in the eighties only 0 93 per cent

PATHOLOGICAL ANATOMY

The principal changes found in persons dead of Mediterranean fever concern chiefly the *intestine* and the *spleen*

The mucous membrane of the *intestine* is hyperæmic sometimes along the whole course sometimes only in parts The solitary follicles and Peyer s patches are mostly unchanged a few of the latter in rare cases are swollen Ulcers as a rule are not present Hughes only found ulceration in three cases out of sixty two In case 1 the ulcers were situated in the cæcum and colon a mesenteric gland having suppurated

The *mesenteric glands* were sometimes found to be enlarged

The *spleen* is enlarged hyperæmic, and occasionally soft and deliquescent, in some cases however, of normal consistency The Malpighian bodies are enlarged

The *liver* is frequently enlarged likewise and is hyperæmic, the gall bladder distended with thick bile Under the microscope slight swelling of the hepatic cells is found and the interlobular tissue is infiltrated with small round cells (Bruce)

The *kidneys* are hyperæmic and exhibit glomerulo nephritis (Bruce)

The *lungs* always appear very congested and are sometimes pneumonically infiltrated the mucous membrane of the bronchial tubes is almost always injected

DIAGNOSIS

The diagnosis of Mediterranean fever is not always easy, the differentiation between Mediterranean fever and typhoid occasionally presenting some difficulty The long duration, the appearance of relapses the pro

fuse secretion of sweat, the occurrence of articular affections, neuralgia, epididymitis and orchitis, and the milder course of the disease, proclaim it to be Malta fever Cases, however, do occasionally occur in which the diagnosis is only established at the autopsy.

Confusion of Mediterranean fever with relapsing fever should hardly be possible The sudden rise and as sudden fall of temperature in the separate attacks, the shorter duration, and the smaller number of attacks (mostly only two or three), the absence of articular affections, neuralgia, &c., and above all the presence of spirilla in the blood, should be sufficient to differentiate relapsing fever from Mediterranean fever

Wright was the first to recommend the *serum reaction* with cultures of the micrococcus melitensis for the diagnosis of Mediterranean fever and the differential diagnosis between it and typhoid and other fevers Monkeys gave a positive reaction as early as the day after the inoculation with the micrococcus and this was maintained up to three [illegible]

PROGNOSIS.

The prognosis, as a rule, is favourable

PROPHYLAXIS

General prophylaxis is afforded by living under favourable hygienic conditions, especially healthy dwellings *Personal prophylaxis* demands the avoidance of the usual well known incidental causes

TREATMENT.

[illegible] wet packs or [illegible] *algia*, antipy[illegible] *sleeplessness* [illegible] bromide of potassium

The *vomiting* is usually checked by small pieces of ice and by morphia

For *constipation*, enemata and mild aperients, especially castor oil and calomel, should be administered To check the diarrhœa when the usual astringents have proved ineffective, more especially if there is a tendency to hæmorrhage, Notter advises the use of ferri perchloridum

The affected *joints* should be suitably bandaged in cotton wool or flannel, and inunction of liniments or painting with tincture of iodine may [illegible] the part and [illegible] ulants and of [illegible]

The *nourishment* of the sufferers requires great care At first liquid

foods must be given to them (milk, bouillon, gruel, broth thickened with barley and with the addition of egg, &c), and only after the fever and diarrhœa have subsided may more solid food be gradually adopted

During *convalescence* the patient should be given strengthening food, wine, quinine, iron. Complete recovery seldom occurs without *change of climate*

When sent home most patients rapidly recover their former strength, but the voyage home must not be undertaken too early, only when convalescence has begun Patients, however, should, as soon as possible, be removed from the unhealthy neighbourhood in which they fell ill

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V

INDIAN NASHA FEVER.

At the Indian Medical Congress of December 1894, Fernandez[1] reported a disease occurring in *India*, more particularly in Bengal It is an acute febrile infectious illness known there by the name of *nasha fever* in the North Western Provinces it is called *nakra fever*, and

never any secretion of a muco purulent nature, and very often also no

particularly marked The patients complain of heat a fulness in the head and severe frontal headache, they likewise complain of severe pains in the nape of the neck, the shoulders and the loins The pains in the neck are at times so pronounced that they simulate the pains of tubercular meningitis The face is reddened and the pupils contracted Occasionally the fever is accompanied by an exanthem consisting of small pinkish red spots and which seem to occur synchronously with bronchial symptoms As to the remaining objective symptoms which the patients exhibit Fernandez gives no account, and does not mention if there is enlargement of the spleen or not

The fever lasts from three to five days, the swelling of the nasal mucous membrane disappearing simultaneously with the fever Occasionally the swelling of the mucous membrane suddenly vanishes when serious symptoms set in the fever increases, delirium and coma supervene, and death may ensue Such a termination, however is of rare occurrence

Frequently such attacks are repeated at intervals of a month, a fortnight, or a week when a hypertrophy of the mucous membrane of the nose is apt to develop

The *etiology* and nature of this illness are obscure Opinions as to the relation of nasha fever to malaria are according to Fernandez, divided The illness certainly rages in malarial districts, but quinine is quite

[1] Nasha fever the Indian Medical Congress, December 24 29 1894, *Lancet* 1895 January 5 p 69

VI

JAPANESE RIVER OR FLOOD-FEVER

DEFINITION

Balz (ı
River or F
febrile cou
ıs peculiar
subject to
necrosis which may be accompanied by swelling of the lymphatic glands
with an exanthem on the skin

The nat ves call th s d sease *Sh ma* mushi *ı e* island ınsect It was also first descrıbed by Palm (1878) under th s des gnat on

GEOGRAPHICAL DISTRIBUTION

The geographical region of the dıstrıbution of rıver fever ıs accord ng

tl e whole extent of
completely unknowı
subject to yearl floods
There are no accounts of this illness from other countries

SYMPTOMATOLOGY

There are hardly any *prodro na* ın rıver fever Should such occur
... certa n d sorders of the general health low
appetıte
al outbreak of the ıllness
by repeated faırly severe
rıgors These are accompanıed by v
ın the temples and forehead palpıtatı
abnormal sensıtıveness to draughts or
ness that ımpels the pat ent to l e down

On the first or second day of the disease *pain in the lymphatic glands* of one part of the body sets in it may be in the groin the axilla, the neck, &c The pain causes search to be made at the seat of the part affected, when, without exception a small round, more or less black, dry scab is discovered, which in all probability had developed during the period of incubation Soft, warm somewhat moist parts of the skin, particularly the genitals and their vicinity the axillæ and the hypochondria, are the spots of predilection of these *circumscribed necroses of the skin* The scab which is from 2 to 4 mm in diameter is very hard and tough, and at first clings very tightly Its periphery which is but slightly, if at all injected is soft, dull red and not tend r either to feeling or on pressure Some times, according to Bälz there are two three, or even four such necrotic spots, an observation on which Tanaka throws doubts No thickening of the lymphatics can be felt along the parts between these spots and the lymph glands but such parts are often painful on pressure

The lymphatic glands are enlarged but not very hard they are movable and very sensitive to pressure The swelling and pain are not confined to these glands but in a less degree attack all superficial glands, mostly symmetrically For instance if the seat of the necrosis is on the right side of the scrotum the left inguinal glands as well as those on the right side, will be affected

The *temperature* during the first days fluctuates between 38 5 and 39 5°. The *pulse* at the same time is relatively but little accelerated, being in men about 80 and in women 100 per minute or more

Conjunctivitis is almost always present The palpebral conjunctiva in particular is much reddened and in the mornings the eyelids are mostly stuck together At the same time the whole eyeball appears to be swollen, prominent and staring

The nose and throat are almost always normal yet a cough and rhonchi can be heard over the lungs The first cardiac sound is frequently impure

The tongue is moist and but slightly coated There is generally rather obstinate constipation The *spleen* is always *enlarged* but not to a great degree the *urine* is diminished and frequently contains albumen (Tanaka) Often, also strangury is observed

The fever increases during the following days and by the evening of the fifth or sixth day has attained 40 or more The fever as a rule is continuous, more rarely remittent The pulse frequency at the same time is relatively slow

On the sixth or seventh day an *exanthem* accompanied by a further rise of temperature, breaks out this first appears on the face on the temples and cheeks The exanthem consists of large irregular dark red papules, which are often confluent on the cheeks The eruption spreads to the fore arms, legs and trunk where it is indistinct on thighs and upper arms The throat and palate generally remain exceptionally a few punctiform spots are observed on the latter Simultaneously with the papules and between these there appear on the arms and the trunk exceedingly minute small dark red nodules the centre of which frequently a little hair is visible The exanthem which varies in distinctness and does not itch is of uncertain duration on an average lasting from four to seven days and in mild cases occasionally only a day

The duration of the exanthem indicates the *maximum of the complaint* The fever is continuous The temperature rises to 40°, even (but very rarely) to 41° while the frequency of the pulse fl... 90 and 100 The pulse is *full* never dicrotic

but
duri
æsthesia, in severe cases the muscles are sensitive on pressure There is frequently hardness of hearing, presumably of a nervous character, and which is apt to continue during convalescence The lips are dry, fissured and easily bleed The tongue in serious cases appears dry and coated at the edges and smooth in the centre, as if polished It can only be moved with difficulty The gums are in a condition resembling that met with in scurvy In serious cases the epigastrium and the left hypochondrium are somewhat sensitive on pressure The stool is constipated throughout the illness, the spleen somewhat enlarged The cough is sometimes very violent, coming on in paroxysms, and is harsh and hoarse, the respiration, especially in women and children, is much accelerated In the meantime the scab has usually fallen off, and in its place there is a crater like ulcer with sharp steep edges and which exudes only a little pus The patients perspire freely and in consequence sometimes exhibit extensive sudamina

About the end of the second week—in mild cases before, in serious cases later—a marked *remission of fever* occurs, and the temperature returns to normal in the course of a few days, meanwhile there is an improvement in the condition generally The patient recovers appetite and frequently there is slight diarrhœa, the urine becomes more copious, and deposit of urates is the rule The patients generally recover quickly, but the ulcer may take weeks to heal, and the sensitiveness of the glands in its vicinity continues even when convalescence is far advanced, the other glands affected become normal before the fall of temperature

This is the course of disease in what we may term typical cases Besides these, still milder and more severe forms occur In the *milder*
and, the fever may be
bed, the exanthem is
nd glandular enlarge
the local affection is
in no way proportionate to the degree of the general condition The largest ulcer ever observed by Balz was on the person of an ambulatory case of the disease

In the most *serious forms* it is more often the complications than the hyperpyrexia that endanger the patient's life and cause death Such complications are parotitis, copious, sanguineous, tarry stools, serious nervous symptoms arising during convalescence (coma, mania), cardiac weakness and œdema of the lungs

The average *duration* of river fever is, in moderately severe cases, three weeks, it is quite exceptional for the disease to last a month Mild cases sometimes only last a week

The mortality is given by Balz as 15 per cent, while according to Tanaka it may be 40 per cent, or even 70 per cent or more

PATHOLOGICAL ANATOMY.

The pathological material hitherto available is principally limited to two *post mortem* examinations undertaken by Kawakami The result of these autopsies was that *distinct local lesions are not to be found anywhere*

The lungs exhibited hypostases the bronchial mucous membranes were much

ETIOLOGY

River fever is an *infectious disease* The unknown virus of disease according to Balz clings to the submerged soil of the above mentioned valleys which are annually flooded the floods doubtless playing an important part in the development of the virus of disease The floods occur regularly during the spring and summer Hemp or corn is sowed on the strips of river bank that have been flooded and during the harvest in July and August the illness sets in The reapers who are at work all day in the fields are almost exclusively attacked it is but rarely that other workers who pursue their calling in the immediate vicinity of the river are taken ill Occasionally however persons fall ill who have

...er of

...ars is
...is
...which
...and

sticky character of their secretions are particularly adapted to retain the smallest atoms rising with the air

Balz has convincingly contradicted the assertion of Japanese doctors that the illness

...the micro-organism as the cause of the illness

The *period of incubation* averages four to seven days

Neither *age* nor *sex* exercises any predisposing influence Though men fall ill more frequently than women or children the cause is that the former are more exposed to the infection

Pregnant women who contract the disease often miscarry and their illness mostly has a fatal termination

The predisposition to the illness is not extinguished by having previously had the disease *Several attacks* in the same person have been observed but subsequent illnesses are milder than the first one

PROPHYLAXIS

Balz in order to ensure the sanitation of the soil in places subject to the illness recommends that it be speedily cultivated with plants which experience has proved to have a salutary influence on bad land and for

this purpose suggests, above all others, the planting of the eucalyptus globulus and of the Japanese Kiritree (Paulownia imperialis)

If Balz s opinion as to the invasion of the virus of disease into the body is correct those persons who are compelled to expose themselves to the infection should protect themselves by scrupulous cleanliness, a goal easily attainable by frequent baths and thorough washing

TREATMENT.

The *treatment* of river fever is symptomatic

High *fever* requires the administration of *antipyretics* (phenacetin antipyrin, quinine, sodium salicylate) Cool or cold baths are not well borne by the Japanese Even antipyretics must be carefully given for according to my experience[1] of the treatment of typhoid, which coincides with Balz s, the Japanese react to these drugs more strongly than [illegible] ium salicylate sufficed to [illegible] arger doses induce danger [illegible] such moderate doses as those mentioned, I have repeatedly observed a fall of temperature of 5° or even more

The *sleeplessness* and annoying cough are combated by narcotics, constipation by alteratives or enemata

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VII

THE MALARIA OF WARM COUNTRIES.

DEFINITION.

UNDER the term *malaria* (from mal aria, Italian for bad air) is com [illegible] nd epidemically, and [illegible] manifestations of the [illegible] matology and thera [illegible] are all attributable [illegible] by a great tendency [illegible] ylactic and remedial agent Europeans in the tropics suffer severely from malaria in one or other form, and the presence or absence of malaria in a place, is decisive as to whether the climate is unhealthy or not This disease, therefore lays claim to our most particular attention

SYNONYMS.

Wechselfieber, Intermittens, Cold fever Marsh fever, Paludism Swamp fever, [illegible] fever, &c

HISTORY.

The history of malaria, and more particularly of those forms peculiar to warm countries, and which formerly had a far greater distribution than they have at the present time, may be traced back to the most ancient times According to W Groff, malaria was known to the ancient Egyptians The word "*dal*" which, amongst others, occurs on the inscriptions of the temple at Denderah, is supposed to indicate the [illegible]

GEOGRAPHICAL DISTRIBUTION

(COMPARE CHART I)

The geographical region of distribution of malarial disease is extraordinarily large *In this respect no other infectious disease can compare with it* In the eastern hemisphere 63 64° N lat (Sweden Finland) forms the western boundary and 55° N lat (Northern Asia) the eastern boundary

In the western hemisphere 55° forms the western limit at which malaria occurs and 45° the northern limit the southern limit in America is 35°, in Africa 30°, and in Australia 20° S lat

Malaria prevails *in the most temperate and also in the torrid zone but as the Equator is approached it increases in extent and intensity* With the exception of the waterless deserts (Sahara Arabia Atacama and Central Australia) there is no extensive continental region on or near the shore that is free of malaria whereas some of the tropical islands are exempt

I will therefore confine myself to the mention of the *most important malarial districts*

In EUROPE these comprise the North German low lying plains especially the Baltic coast of Prussia Pomerania and Mecklenburg Northern Silesia the river plains of the Mark the swampy and pasturage lands of Hanover and Oldenburg the Western coast line of Schleswig ... Westph la along the Rh ne and its ... rance ... rtment ... of the ... in the ... o, &c ... es the ... hrough ... arshes ... ardinia ... ng the ... of the *Black Sea the Sea of Azov, and the Caspian ...* ... djacent steppes in Russia the valleys of the Dniester the Dnieper and the Volga the Caucasus in Sweden principally on the shores of the large lakes in the south in Denmark only *in the Islands of Laaland and Falster* and perhaps the East Coast of England

In ASIA malaria is endemic on the coasts of Asia Minor and Syria

... the islands of ... Sokotra, and ... ade appeared ... nd Rodriguez, though contiguous to Mauritius and exposed to the same climatic influences, and the Cape, enjoy almost absolute immunity The same ..., as well as most of ... n the Fiji Islands,

... ion of the disease includes the southern, central and prairie states of the United States of North America, the coasts of the Gulf of Mexico and of the Caribbean ...

... ever, and generally palpably induced by meteorological influences, such as excessive falls of rain, floods, great heat or drought, or the sudden sinking of standing surface water, *epidemics* occur which are distinguished for their severity, and run a course fatal to both aliens and natives These epidemics, moreover, may extend to regions in which malaria is not endemic Outbreaks of malaria may spread over vast tracts of land and, occasionally covering entire continents, may cause actual *pandemics* that may last months or even years Such a pandemic raged during 1557 1558, when nearly the whole of Europe was attacked by it During the two following centuries and also during the nineteenth century, a series of severe epidemics came under observation, the most extensive of these occurred from 1823 27 and visited nearly all the countries on the ...

The *epidemic occurrence* of malaria on *board ship* will be discussed later

ETIOLOGY.

The investigations of the last twenty years have resulted in the discovery that malarial diseases are originated by *certain living organisms which cling to or invade the red blood corpuscles and which belong to the order of the protozoa.*

...ed by Laveran in Algiers At ... was confirmed and con side ... Marchiafava, Celli, Golgi Bignami, and others The etiological importance of the malaria para...

Further confirmation of the opinion that these blood parasites are the cause of malaria is furnished by the experimental investigations which were first undertaken by Gerhardt in 1884, and later were mostly conducted in Italy The experimenters succeeded, by means of injecting the blood of malarial patients subcutaneously, or into the veins of healthy persons, in generating malaria, which in most cases was of the same *type of fever* as that from which the *original patient was suffering*, this was especially the case in the carefully observed experiments of Di Mattei

The separate types of malaria are caused by separate parasites which are distinguished by differences in their growth and pigmentation and more particularly by the diverse duration of their development Opinions are divided as to whether it is the question of the same or ... or of morphological varieties of one and the same kind ... his convic... by Babes ... unreasonable ... s, and soil ... anic fluids ... of malaria parasites may occur

The fact, also that in epidemics of malaria all forms of the disease occur, lends still more colour to Laveran s opinion, while the results of ... transmissions favour the views of those who

... (1) The *quartan parasite* ... *t in three days and* is the ... (I) In its early stage the parasite appears as a small transparent unpigmented form, with indolent ... red blood corpuscle gradually increas... graduall... pigment ... corpuscle ... *mbling* a ...le The pigment now assumes a central and radiated ... a spoke like design now *first* appears *on* the disc, which later on shows a

radiated division into from six to twelve pear shaped segments (*daisy or rosette form*) At last the whole break up into the same number of small, roundish little bodies—erroneously called spores—which like the pigment become free This separation occurs simultaneously with the commencement of the fever, or shortly precedes it The spores which represent a new generation again seek red blood corpuscles, and thus the process commences anew Sometimes two, or even three, parasites invade one blood corpuscle The released pigment is taken up by

adolescent form has more mobility than the quartan parasite, it develops in the red blood corpuscle which becomes discoloured and attains dimensions double its normal size The parasite has the appearance of a sphere which, after the collection of the pigment in its centre falls into 15-20 spores that are smaller than those of the quartan parasite and form an irregular little heap reminding one of a bunch of grapes or mulberries, more rarely they form two circular rows (*sunflower shape*)

Through the presence of two or three broods of quartan or tertian

parasites irregular fevers are caused

(3) *The parasites of malignant tertian fever* appears in Italy in summer and autumn in contradistinction to the benign tertian fever of spring (Marchiafava and Bignami), and is identical with *tropical malaria* (see fig 15)



FIG 15 —*The parasite of tropical malaria after R Koch* *a* Red blood corpuscle with small annular parasites *b* red blood corpuscles with medium sized annular parasites *c* red blood corpuscles with large ring shaped parasites *d* circular parasite with an agglomeration of pigment in the centre *e* lobulated parasite *f* rosette-form arrangement of the spores *g* free spores with residue in the centre *d-g* from the spleen of a cadaver

The cycle of development lasts forty eight hours The parasite is a small, briskly moving little body smaller than the former two In a condition of rest it assumes the so called ring or signet ring form or, more correctly speaking the form of a disc with a ring shaped stained outline Its minimum size is according to R Koch ⅙ or ⅕ the diameter of a red blood corpuscle When it has attained its greatest circumference its size is about ⅕ of that of its host In stained preparations the circlet of the small and medium sized parasite is seen to consist of a thin circular line which exhibits at one, or occasionally at two, opposite places a dark spot It is only when the parasite has almost attained its full dimensions that the half of the circular

and assumes the shape o

which perhaps represent

less, but is only seen in

such remarkably tiny particles that it is only with particular attention that the pigment may be observed in the large parasites at the broad portion of the crescent as a brownish gleam The stronger or weaker pigmentation also depends on the preparations in fresh preparations the

a lump (Koch) After finishing its growth the parasite forms spores It becomes lobulated rosette shaped while the pigment collects at the centre or more towards the periphery and is finally divided into six to twelve little balls The propagation however rarely takes place in the peripheral blood more generally occurring in internal organs particularly in the

completely developed They are found partly partly free in the blood found in severe *forms of malaria* originated by the malignant tertian parasites but not in the benign quartan and tertian fevers nevertheless like the spherical and

consist of two parasites that have invaded the same blood corpuscle and coalesced he therefore calls them syzygi) and represent sterile forms which however as we shall presently see are of great importance to the further fate of the parasites

As they may be seen by means of Romanowsky s process of staining (see p 104) they contain chromatin

Inoculatory experiments undertaken by Elting with blood that only contained the crescents and oval forms of æstivo autumnal parasites gave negative results

In Cameroon F and A Plehn very rarely found crescent (at most in one case out of ten)

(5) *Flagellated bodies* [Corpora flagellata polymitus form] (see fig 16 table II) These are spherical pigmented little bodies about the size of a red blood corpuscle that are free in the blood and that are provided with one to four long delicate mobile flagellæ that sometimes terminate with a slight enlargement It is observable by the microscope how the flagellæ when thrown off dart through the plasma with lively snake like movements

The flagellated bodies are present in *all forms of malaria* They are however not seen in the blood immediately after its removal from the blood vessels but only after some minutes usually not before a quarter of an hour (Manson) They originate from the large free pigmented spheres that are merely parasites that have not sporulated (as occurs in

[1] From π λύμ τος i.e. many threads

all k nds of paras tes) or from crescents—these previously assuming first an oval then a spherical form—by the shooting out of processes The flagellæ that become free and wh ch contain cl romatin represent that form of malar a parasite that is destined to *propagate tl e species outs de the human body*

[1] *Deu sche med Wsch* 1899 No 36 p 585 *Ibid* 1899 No 41 p 717
[2] *Munch med Wsch* 1900 No 6 p 186

such remarkably tiny particles, that it is only with particular attention that the *pigment may be observed in the large parasites, at the broad* portion of the crescent, as a brownish gleam The stronger or weaker pigmentation also depends on the preparations, in fresh preparations the

or more towards the periphery, and is finally divided into six to twelve little balls The propagation, however, rarely takes place in the peripheral blood, more generally occurring in internal organs, particularly in the spleen bone marrow and the cerebral capillaries The parasites disappear out of the blood, so that during the attack generally only a few are found and sometimes none at all Whereas in ordinary tertian fever the infected red blood corpuscles swell up in malignant tertian fever they tend to shrivel and become darker assuming a tint reminding one of old brass

(4) *The crescents or sickle forms of Laveran* (see fig 18, table I) These are oval fusiform, or crescent shaped formations pigmented in the centre, which have *no amœboid mobility*, but possess the capacity of slowly altering their shape (Mannaberg) When completely developed their size exceeds that of the red blood corpuscles They are found partly in red blood corpuscles, or clinging to the same, partly free in the blood, sometimes also contained in leucocytes They are found in severe *forms of malaria*, originated by the malignant tertian parasites, but not in the benign quartan and tertian fevers nevertheless, like the spherical and

consist of two parasites that have invaded the same blood corpuscle and coalesced, he therefore calls them syzygi) and represent sterile forms, which, however as we shall presently see are of great importance to the further fate of the parasites

As they may be seen by means of Romanowsky s process of staining (see p 104) they contain chromatin

Inoculatory experiments undertaken by Fiting with blood that only contained the crescents and oval forms of æstivo autumnal parasites gave negative results

In Cameroon F and A Plehn very rarely found crescents (at most in one case out of ten)

(5) *Flagellated bodies* [Corpora flagellata, polymitus form[1]] (see fig 16, table II) These are spherical pigmented little bodies, about the size of a red blood corpuscle, that are free in the blood, and that are provided with one to four long, delicate, mobile flagellæ that sometimes terminate with a slight enlargement It is observable by the microscope how the flagellæ when thrown off dart through the plasma with lively snake like movements

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ı resent n anæm a (Cohn)

Deu sche, med Wsch. 1899 No 36, p 585 *Ib d* 1899 No 44 p. 71
[a] *Munch m ed Wsc* 1900 No 6 p 186.

with a nucleus Sporulation according to Italian authors (Grassi Feletti and others) is accomplished by direct division of the nucleus, and according to Romanowsky by karyokinesis

rhizopodes

preparations

For clinical purposes staining with *Czenzinsky Plehn's solution* will be found

forms of the tertian and quartan parasites (Koch)

[1] In a tropical climate in which pure alcohol may attract a quantity of moisture from the air, F Plehn recommends fixing for three to four minutes with concentrated alcoholic solution of sublimate with subsequent thorough washing

A number of preparations may have to be examined before p: 'are discovered The numb r of parasites as a rule increases w severity and duration of the disease In pernicious malaria th remarkably numerous; Van der Scheer occasionally saw from fifty to in one field of vision On the other hand there may be severe yet only a few parasites may be demonstrated in the blood fr finger. This disparity between the number of parasites and the s of the illness is, however, accounted for when an autopsy admits examination of the viscera (Bignami) When infection is quite as during the few first days of disease, the parasites are son missed, for they are only extant in small numbers, and therefo difficult to discover, or else they have not yet reached the circ

parasites, they disin
ve penetrated by fee
the hæmoglobin the
anæmia and *melanæ*

characteristic of malaria, ensue, and in consequence of the mela melanosis of the internal organs is set up At sporulation, formed by the parasites is set free this originates the fever and taneously attracts the leucocytes from the spleen, the bone marr the lymphatic glands into the blood, chemotaxis and leucocytosi the result The regular cycle of the attacks is, according to F explained thereby, namely, that by the chemical processes set up the attack of fever such organisms as have not developed, as those that have in the meantime reached the body throug infection and are still in the amœboid stage, are killed

The *debilitating disorders* and the numerous *organic diseases* may be set up in consequence of malaria, with or without symp fever, are also attributable either to the effect of the poisonous formed by the parasites, or to the interference with the respective through red blood corpuscles containing parasites, or to pig leucocytes *Spontaneous recovery* takes place—as shown by the c tions of Marchiafava, Celli, and Golgi—through the parasites bein and absorbed by the leucocytes

Schellong explains the different symptoms of malaria as occurring through stasis, which ensues as a result of the disintegration of the red blood corpusc various organs by the influence of the malaria parasites. Fever ensues disorders of circulation in the heat regulating centres

Efforts to artificially cultivate malaria parasites have hitherto They have also hitherto never been discovered in inanimate obj the air, water or elsewhere The statements of Coronado and Hel claim in this respect to have had more success than other invest are not calculated to inspire confidence Two questions are th raised Whence do the malaria parasites originate? and, by what do they invade the human body?

There are three hypotheses as to the mode of infection. These

(1) The air theory.

(2) The drinking water theory

(3) The mosquito theory

(1) *The air theory*, which is indicated by the name of the (mal' aria), is that the malaria parasites reach the air in some way, in atoms of dust, from the soil which contains them in some form c and is inhaled by the respiratory organs

frail beings as malaria parasites should be able to reach the air and withstand desiccation, this theory does not coincide with the fact that frequently the malaria centre is narrowly confined Often in one town there are healthy and unhealthy quarters Thus, to cite a few of Bignami s examples in Rome outside the Porta del Popula dangerous fevers occur, while the few dwellings at the commencement of the Corso only 100 m distant, are healthy The hospital of S Michele di Ripa Grande is free from malaria, but at a short distance, in the vicinity of S Paolo there are dangerous malarial centres In Palo there are actually houses on the quay in the rooms of which, facing the sea one may safely sleep

Those inhabitan

from malaria w

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ing to Vincent and Burot, during the campaign in Madagascar the troops on shore were decimated by malaria, while the crews who for months were on board ship hardly 300 m from the shore, were not ill at all Kohlbrugge reports of the notorious port Tandjong Priok (Batavia), that if ships anchor in the inner harbour for only one night, that time suffices to infect those on board with malaria, if however, the ship remains in the outer harbour, the crew, &c, remain healthy

Moreover, it is known that malaria only rises a short distance above the soil Even a slight elevation of a few yards above the level of a much infected marshy soil would suffice to protect one from the infection Thus the inhabitants of the Pontine marshes during the fever season sleep on platforms erected on piles six or seven yards in *height* (*Bignami*)

The air theory is likewise contradicted by the fact that infection ensues most frequently when the soil is damp, not when it is dry and dusty.

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his opinion

of malaria

with the dust

(2) According to the *drinking water theory* the infection is brought about by drinking water originating from malarial soil This theory is

persons living

who make use

the other hand

ging in certain

places disappeared

These observations, however, are balanced by others which can be used to weaken or nullify this theory, a few of these are herewith communicated

The following observation of Boudin[1] is frequently quoted In July, 1834 three French men of war started from Bona (Algiers) for Marseilles During the voyage a malignant epidemic of malaria broke out on board one the Argo with the result that of a crew of 120 men 13 died and on arrival at Marseilles 98 had to be

showing that in Bona several

sojourned some time

[1] Traité de géographie et de statistique médicale 1., Paris 1857, p 142

The drinking water theory is further contradicted by the results of experiments conducted in this direction. Celli for a period of from eight to sixteen days gave large quantities (½ to 3 litres) of water, which originated from exquisite malaria soil, to six healthy persons, but with negative results. Zeri's experiments were equally fruitless and consisted, on Celli's suggestion, in getting nine persons to drink daily, for from five to twenty days 1½ to 3 litres of water from malarial regions; moreover, sixteen persons were requested to inhale desiccated marsh water, and finally the water was administered by the bowel to two adults and three children (Bignami). In contradistinction to these negative results there were positive results in one of Ross's experiments, but it carries no weight, for it was undertaken in a fever region, and later repetitions of the same experiment gave negative results. The experiment alluded to was carried out on an Indian native who had never had fever; it consisted in giving him 1 to 2 drachms of water containing a number of mosquitoes full of malarial blood, with the consequence that eleven days

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be completely elucidated. According to the present condition of these investigations it appears that the malarial parasites are withdrawn from the human body by blood sucking mosquitoes[2] in which they go through further stages of development, and are then again transmitted to human beings by mosquito bites.

However, all species of mosquitoes do not act as intermediary hosts

[1] Nuttall in the *Cbl f Bakt*, xxv and xxvi gives a representation of the historical development of the mosquito theory.

[2] *Mosquito* (gnat) is the collective name for several related insects which belong to the genuses Culex, Anopheles, Ædes, Ceratopogon, Simulia and Phlebotomus; they by no means exist in warm countries only, for they occur even in Arctic regions.

but only certain of the genus Anopheles[1] which is also widely disseminated in Europe According to the investigations of Grassi, Bignami and Bastianelli the *Anopheles claviger, Anopheles bifurcatus Anopheles superpictus* and *Anopheles pseudo pictus* are principally concerned in this connection and this genus appears to serve as intermediary host to various kinds of malaria parasites The *Anopheles claviger* is the most commonly met with and is easily recognisable by four black spots on the wings

Moreover, only the female mosquitoes bite, and their span of life may last weeks and even months For a few days after every meal they deposit their ova on the surface of stagnant water or in damp places as a rule where they themselves were born, and from the ova develop larvæ nymphæ and finally the winged insects

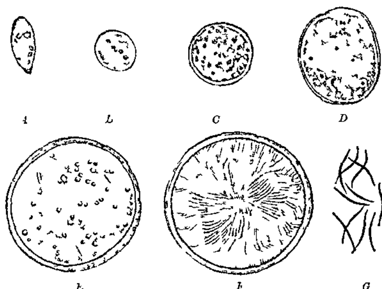


Fig 19 —Development of the sporozoite cysts in the body of the mosquito After A Celli F fully developed sporozoite cysts G free sporozoites

The demonstration of the entire cycle of development of the malaria parasites in the body c
The history of the
affecting birds—*Prote*
(Labbé)—of which li
hosts is better known
of the cycle of development of malaria parasites may be made —

The above mentioned quickly moving flagellæ (see p 102) which release themselves from the flagellated bodies are spermatozoa These originate from spherical parasites which possess a large compact chromatin body and a slightly tinted protoplasm (microgametes spermoids) Besides this spherical form there is another which is distinguished by having a

[1] The differences between the Anopheles and Culex are described in the Brit. Med Journal 1899 September 30 p 809 and deals principally with the auxiliary apparatus of the mouth-organs

more deeply tinted plasma and less chromatin (macrogametes, ovoids)

remainder as a small bent little worm These little worms, which contain chromatin, plasma, unstainable round spots, and pigment also, are transformed after a time into coccidia-like spheres containing pigment (hæmospondia, sporozoite cysts) which appear on the outer wall of the mosquito s stomach (see fig 19) These spheres grow during the following days, and secondary spheres form in the same, the secondary spheres in their turn being transformed into a bundle of thread like formations (sporozoites) each containing a granule of chromatin The large round forms burst and the *sporozoites become free and scatter* in the body of the mosquito, but finally they are only found in the two poison glands, which are near to, and are connected with, the sting This process, first observed by Ross in the proteosoma, was later on observed by the Italian investigators above mentioned in the malaria parasites also

The period that intervenes between the time of the infection of the mosquitoes till they themselves are able to convey infection, depends on the temperature, and differs in different malaria parasites, it may fluctuate between one and several weeks

Ross succeeded in infecting healthy birds through mosquitoes that had sucked proteosoma blood, and the Italian investigators had the same good fortune with malaria parasites They caused a number of *Anopheles claviger* to suck the blood of a patient with æstivo autumnal tertian fever After ten days, having previously examined several of the mosquitoes to convince themselves that the salivary glands contained sporozoites, a healthy man was bitten by three mosquitoes After twelve or thirteen

The
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from

man to the mosquito, and from the mosquito again to man The parasites, therefore, are beings that have two hosts and alternating generations, a sexual and an asexual one As the sexual form of development gone through in the mosquito is to be regarded as a higher form than the asexual one in man, the former in contradistinction to the above used designations must be looked upon as the definitive host and the latter as the intermediary host

The investigations have hitherto not proved certain points which possess some probability, namely, that parasites might be transmitted

perhaps they may be degenerative forms of sporozoites It is, however, not beyond the bounds of possibility that they represent long lived forms which perhaps might infect the larvæ of mosquitoes, once they reached

the water As yet it is not known how the sporozoites injected into

on ships, though engaged in business on shore, are much less apt to suffer from malaria than those sleeping on land As already mentioned above, malaria not rarely possesses narrowly confined centres, and can only rise slightly above the ground, this may be attributed to the fact that mosquitoes do not move far from the place where they are born, and mostly stay in the deeper strata of the air near the ground Many protective measures employed in malarial regions to avoid fever serve simultaneously as … may
be mentioned the … er
night, sleeping wit… es,
and the use of mo… ng
his African travels … tes
his freedom from … *He*
imagined that the virus of disease was represented by a corpuscular

disease

Under the name of *Texas fever* or *cattle malaria* is comprehended a *cattle* disease which is originated by micro parasites burrowing into the red blood corpuscles, it occurs in America, especially the south of the United States in South Africa German East Africa, Australia, Italy, Sardinia, the lands of the Danube and the south west of Russia and Finland

The micro parasite discovered by Smith and Kilborne represents a pear shaped form

Koch exper mentally is caused not by the t cks that infested the s ck an mals but by th r brood, the larvæ that ha e e caped from the egga. In what ma ner and in wha stage of dev lopment the paras tes pass from he female t ck to the larvæ is still unknown

During the summer n onths the danger of co tag on and the sever ty of the pest lence is greatest

may occur from rupture of the spleen

The anatom cal changes found n an mals that die from Texas fever are —The bl od is seen to be very l qu d and pale The subcutaneous t ssue the muscles and all the organs exh b t anæmia of a h gh deg ee and a d t nct cteric t nt Small hæmorrhages are present on the nner layer of the per card um The myocard um is yellow sh r d dull soft and br ttle and exh b ts sub endocard ac blood extrava

d stribut on as known at present is Ind a Burmah South West and E a t Africa. The d sease is most often endem c n the marshy all ys near r vers a d lakes Ac ord ng to the ob e vat ons made in Ind a t appears espec ally dur ng the ra ny season

The cause of the tsetse d sease wh ch was d scovered by Bruce s a *species* of *trypanosoma* The adult is two or three t mes as long as the d am eter of a r d blood

R Scheube article on Texas Fever in 'Eulenberg's Encyklopad Jahrbl vi 1899 p 565

and periodically reappear until after many months death ensues Spontaneous

is urged that in some malarial districts
insects are rare or even non extant
imbers in malarial regions Thus in
n there are but few mosquitoes and
the year, though malaria rages there
a the worst fever centre of Cameroon
on the Joss Plain mosquitoes of every kind, as also other stinging insects are remarkably rare, and in other places such as Kibi, are entirely absent Proofs of the correctness of such statements are urgently necessary Grassi mentions that in Italy he succeeded in confirming the presence of mosquitoes in numerous regions where their existence was denied by the native inhabitants On the contrary in some malarial districts the occurrence of malaria is strictly connected with the occurrence of mosc
occur in the
town The
Rome The
quitoes and also from malaria The absence of malaria in many regions swarming with mosquitoes has no significance, for besides mosquitoes (and indeed certain species of the same) the existence of the malarial parasites also is necessary for the origination of the disease

The mosquito theory is discountenanced also by the fact that no positive example is known in which malaria has been carried by a sufferer from the disease to a place where there is no malaria but where *mosquitoes exist* notwithstanding the frequent change of location of malaria patients

and one is equally positive that the development of the disease depends on two important factors (1) a relative moisture of the soil, and (2)

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amongst the European soldiers and twice as great amongst the native troops than it is in the interior malignant malaria being the principal cause The following kinds of places are very favourable to the development of malaria the banks of large rivers subject to frequent floods the margins of lakes ponds, smaller rivers brooks canals and pits in countries artificially irrigated for purposes of cultivation (rice) and in valleys at the foot of mountains, such as the Terai on the southern declivity of the Himalayas The explanation of this is that stagnant

[1] B Scheube, article "Surra" in "Eulenberg's Encyklopäd, Jahrbb viii 1899 p 503

wly flowing waters form the breed ng places of mosquitoes wh ch
ot only fresh water but also sea water in which to deposit the r ova
alaria however may be endemic in places in which there is not a
on of marshy soil which on the contrary is very dry as in the
n Campagna the dry sterile plateau of New Castile on tl e table
of Persia India &c The dryness of the soil however by no
s excludes the existence of smaller collections of water such as
es pools or muddy spots in which mosquitoes can develop The
also holds good for the rainless oases of the African Sahara subject
laria

he existence of malaria is especially favoured by the *alternate
ug and drying of the so l* whereas a thoroughly soaked or quite dry

develop
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this has

warm countries
the disease exist
he sole cause of
e la Plata which
subject to periodical overflows and the swampy districts of New
donia may be quoted as examples

The geological cl aracter of tl e soil is only of importance to the
tence of malaria in so far as it influences the porosity of the soil and
apacity for taking up and retaining moisture No formation no
eral excludes the absolute occurrence of malar a (Hirsch) yet by
lilection it appears on clay soil and less on chall and gravel soil

The *conformation of tl e soil* on the other hand exercises an essential

e steep conical hollows from which the deposit of water can flow
kly are most unfavourable to the existence of malaria

The breed ng places of Anopl eles are mostly small collect ons of water containing
es The larvæ mostly live on alg des (*Brit Med Journ* Sept 30 1899 p 869)

the geographical latitude In Germany the limit is 400 to 500 m, in Italy 600 to 1,000 m, the same holding good for the mountainous regions of Corsica, and for the declivities of the Atlas mountains and in

rs at an altitude of 1,000 to
ateau of Ceylon, and on the
malaria is still extant at a
height of 2 000 m, and in the Peruvian Andes it even occurs at an altitude of 2,500 and more

At these elevations, valleys with but slightly sloping sides and trough shaped hollows in the high plains form the seat of the disease. The mosquitoes, also, which require warmth and moisture of the soil for their development, are missing at a certain height The limits for the occurrence of malaria and mosquitoes occur almost coincidently, according to Koch

atest
strict
from malaria These facts are in accord with the mosquito theory Changes of the soil of all kinds afford ample opportunities, when it rains, for the formation of small collections of water which may become the breeding places for mosquitoes These puddles disappear when the ground is properly cultivated, and are seen again when the ground is neglected

After changes of soil in consequence of *earthquakes* the appearance of

more apt to be attacked than the central

uninhabited regions where mosquitoes could not have become infected from man. The explanation of this is that in such cases other animals

take the place of human beings, and in this connection the bat is particularly mentioned by Dionisi who found blood parasites closely resembling malaria parasites in these animals Manson has endeavoured to [illegible]

observations should be collected as to whether malaria can actually be acquired in such places as possess no human dwellings in their vicinity, as, for instance, the primeval forest

Temperature is the first to be mentioned of the *atmospheric influences* which are to blame for the appearance of malaria A certain high temperature is necessary for its development *Cæteris paribus* its intensity depends on the temperature of the year and still more on the average temperature of the summer months According to Hirsch the temperature registering 15° to 16° forms the limit at which malarial fevers can occur, those regions in which this height is not attained by the mean summer temperature remain exempt from the disease The more serious forms are principally observed in warm countries in cooler countries malaria generally occurs in the warmer summer months only Yet the winter epidemics observed in Russia have proved that malaria, under certain circumstances, can develop at winter temperature These facts are in complete unison with the mosquito theory A certain degree of warmth (14° and upwards) is according to Koch, necessary to the development and maturing of the malaria parasites in the body of the mosquito It therefore follows that the same kind of mosquito may be [illegible]

[illegible] ear and that [illegible] othing more [illegible] bese will be [illegible] in summer

A great *change of temperature* does not influence the origination of malaria a great fall of temperature is however of importance as relapses may be caused by chills

Atmospheric depressions and the moisture of the ground attendant on the same are of great importance As already mentioned, a thorough soaking of the soil is deleterious to the development of the mosquito the [illegible] velopment depends on the nature [illegible] copious must be the amount of [illegible] avy rain has a deterrent influence [illegible] pical countries malaria is most severe, and has a larger area during wet years These facts are also elucidated by the mosquito theory

The same holds good as to the influence of the *seasons* on the genesis of malaria which is dependent on the co operative effect of temperature and atmospheric depressions It is the degree of temperature in colder climates which induces the periodical predisposition to malaria the necessary moisture being generally extant, in hot climates, on the other hand, the atmospheric depressions favour the outbreak of the disease the heat never being absent

In *cooler climates*, according to Hirsch, two periods of marked fre-

quency of disease are observed one in spring the other in autumn, the latter is more striking, and the more severe the malaria, the more severe will other illnesses also be In summer there is a considerable abatement of illness and the minimum is attained in winter The same condition is shown in high lying or mountainous regions of the tropics and sub tropics The climax of the great epidemic or pandemic out breaks generally occurred during the latter part of the summer and in the autumn Future investigations will show what relation relapses the incidental cause for which is furnished by frequent chills, may bear to the spring infection Celli and Del Pino found in the Campagna that the fevers of March to the end of June were relapses of former infections Towards the end of June the first infected anopheles were found and their number increased in July and August

In *sub tropical regions* the second period of disease which, starting in the summer attains its climax towards the end of the summer and the commencement of autumn, and sometimes goes on till the winter, is more important than the spring period of the disease, so that the latter is fre quently non existent there is then only one period of illness attaining its maximum in summer and autumn, the minimum of disease being in winter and spring

In the *tropics* the prevalence of the disease is connected more or less with the rainy season Generally the most numerous and the severest illnesses occur in the times of transition from the dry to the rainy season, and from the rainy to the dry season, or during the months after the rainy season they occur much more seldom at the height of the rainy season when in Deli in Sumatra (Martin) and in New Guinea (Schellong) the minimum number of illnesses is notified In Cameroon, according to Plehn the rise of malaria follows the depression of the barometer fairly reliably after about a month, the largest number of deaths, however, takes place at the height of the rainy season The differences exhibited in this respect by separate places undoubtedly depend on the nature of the soil and the cause can only be explained by a minute special study of all the attendant physical conditions

autumn

The *winds* only play a subordinate part in the development of malaria but when they blow over marshes or other sources of malaria they may carry the disease to fever free spots Rasch observed in Bangkok the inmates of certain houses were, from this cause, attacked by fever during the south west monsoon The transmission of malaria however, by means of winds can only take place over short distances, and hills woods and similar hindrances suffice to protect the houses to the leeward from the illness, this fact is explained by the mosquito theory, for mosquitoes, which are unable to fly far without resting, and which hide in the grass and bushes when it is windy, cannot be driven far by the breeze and are stopped by obstacles It has already been

. short distance from a malarial coast
exceptions occur, thus Brunnhoff
off Arica (Peru), two German miles

from land, malaria occurred though there had been absolutely no leave of absence on shore

Favouring influences are sometimes ascribed to particular directions of the wind In Italy and Sicily malarial disease increases in extent and intensity when the *sirocco*, the African west wind blows According to Hirsch, this is attributable to the thermometrical and hygrometrical conditions of the atmosphere caused by the influence of the sirocco On the coast of the Gulf of Guinea the wind blowing from the desert here called *harmattan* causes the cessation of malaria (Fisch) On the tropical sea coasts the sea breezes blowing by day have a purifying effect while the land winds which blow at night convey malaria from the interior to the colonies on the coast

Cold winds occasion chills and through these relapses are often originated

There are several observations from which it would seem that the virus of malaria may be carried from one spot to the other by soil or other inanimate objects, such as clothes &c In these cases infected mosquitoes were probably transported with the articles

Salisbury, according to Hirsch even proved experimentally the transportability of the virus of malaria He filled several boxes with earth taken from the surface of a notorious malaria soil and took these to a very dry district about five (German) miles from the malarial district situated about 300 feet above the level of the water and where no case of malaria had ever occurred The boxes were placed on the window-sill [illegible]

The endem [illegible]

series of examples of actual ship malaria The following observation published by Simon is particularly interesting —

In March 1897 the gun boat "La Vipère" was stationed in the Bay of Halong and six men of the crew out of a total of seventy seven men of whom none for a considerable time had been on shore were attacked by malaria The soil of the [illegible]

disinfected

In a similar manner the development of epidemics in countries hitherto exempt from malaria might be explained One may imagine that the importation of the disease may be effected either by infected mosquitoes which, like locusts, invade entire districts or in case of the presence of those species of mosquitoes that serve as hosts to the malaria parasites the infection may be spread by them through the medium of malarial patients The epidemics are often preceded by floods which afford opportunities favourable to the development of the mosquitoes

From what has been previously said it will be seen that, as a whole the epidemiological facts in regard to malaria coincide entirely with the *mosquito theory, leaving only one or two points to be cleared up*

The *period of incubation* is supposed to fluctuate between a few hours and several months There are certain instances in which it has been observed that the disease only set in six or even ten months subsequent to the individual leaving the malarious district (Braune and Fiedler) In analogous cases, however, it would be more correct to speak of *latent infection* than of so long a period of incubation On the other hand, the statements that occasionally the illness breaks out a few hours after arrival merit little attention, in view of the course of development of the parasites The fact is that in fever regions every feeling of indisposition is, without confirmation, attributed to malaria From ten to fourteen days may be taken as the average period of incubation, this is the time observed on board ships which have only held communication with the coast for a short time

In experimental malaria, the period of incubation according to [illegible] *the different kinds of* [illegible] of blood inoculated. [illegible] fever ten days and in æstivo autumnal fever three days

By means of preventive injections of serum Celli and Santori were able to considerably prolong the period of incubation of experimental malaria in animals naturally immune to malaria (buffaloes horses cattle)

Race and nationality play an important part in the ætiology of malaria Though no race or nationality are entirely exempt, still, according to Hirsch the nations belonging to the Caucasian race (Europeans Arabs of the Barbary States, Indians) exhibit the greatest predisposition [illegible]

quinine In German East Africa [illegible] they go to the coast, are seized by malaria of a remarkably severe type Should they recover, they become immunised like the coast dwellers of the same race, whose immunity may be ascribed to the circumstance that their forefathers were immune, and that they themselves had probably had the illness mildly during their youth The same immunity gradually increasing from the time of their birth is enjoyed by all natives of malarial regions in their home This immunity, however, is extinguished if they are transported to another climate even if it be no more unfavourable than that of their own home In Cameroon, F Plehn very rarely observed malaria in the native negroes, and on the other hand very frequently observed it in imported negroes The natural immunity of the natives may be annulled by the unfavourable hygienic conditions under which they live Thus, according to Roux, in Bengal the natives suffer more frequently and more severely than the Europeans, and Fayrer made the same observation in Bengal

The *Europeans* newly arrived from Europe are the most predisposed to malaria When they have been exposed for some time to malarial

influences without falling ill, they, like the natives, acquire a certain immunity Complete acclimatisation, however, never takes place After a long period of health a remarkably severe attack may set in, while, on the contrary, persons who immediately after their arrival in a malarious region have suffered from a severe attack, are subsequently free from relapses for a long time (F. Plehn) The immunity thus acquired, however, becomes insufficient, or is lost, if the epidemic increases in severity, as it is also after a long stay in malaria free districts Immunity, moreover, only holds good for the locality in which it was gained, should the person to whom it relates go to other malarial regions his protection from the illness is lost

The *half castes* of European and native parentage, in regard to their liability to the disease, take after the Europeans more than after the natives (Martin)

As to the different forms of malaria, Europeans newly arrived from Europe suffer more from severe acute forms and acclimatised persons from chronic forms of malaria In Europeans the quotidian or remittent type of fever prevails, in the less predisposed races the tertian or quartan type

[illegible]

amongst the military

As to *age*, the largest contingent, according to Schellong, is furnished by the age of childhood and youth up to the thirty fifth year Old folks exhibit the least predisposition, but once attacked run greater risks The first years of life are most predisposed to the disease

Some babies are *born* with malaria exhibiting at birth an enlarged spleen, a pale cachectic complexion, and œdema of the feet De Freytag and Van der Elst, during 1873 and 1878 observed in Atjeh that all newly-born children were suffering from malarial cachexia, and most of them died during the first months of life The presence of malarial parasites in the blood of the fœtus of malarial mothers has been repeatedly confirmed (Bein and Kohlstock, F Plehn) Winslow reports that the child of a malarial patient suffered from daily convulsions from the day after birth, the malarial nature of these attacks was confirmed by the discovery of the parasites in the blood, which disappeared after the administration of quinine According to Felkin, malaria may be also transmitted by the father, the mother remaining healthy meanwhile This author is of opinion that malaria may even occur *in utero*, as evidenced by lively tremulous movements of the child it may also be transmitted by suckling The possibility of transmission by means of the semen, or by [illegible]

chronic forms, tending to cachexia are the most usual (Martin)

According to Dempwolff, the *temperament* is more decisive as to predisposition than the constitution He found that phlegmatic persons, religious natures, and fatalists bore the stay in New Guinea very well; while sanguine persons, those of an ambitious, active nature and persons of a nervous temperament, suffered severely from each attack of fever, fretted themselves beforehand, and mostly had to be sent home ill

There is however an *individual predisposition* which exists ind pendently of constitutional or other conditions Perhaps this may ha some connection with the fact that certain persons attract insects su

influences and chiefly fall ill from acute affections while merchants an officials suffer from the chronic forms Out of door workers howeve acquire immunity much more quickly whereas persons with indo occupations always suffer from disorders of acclimatisation and soo become anæmic (Martin)

The predisposition is heightened by all *enfeebling circumstances* suc as colds becoming wet bodily and mental exertions emot on depriat c of sleep working in the sun (sun fever)[1] insufficient food or food of b quality (tinned goods) thirst sexual excesses opium smoking oth illnesses and incidents (sea sickness menstruation confinement) injuri to the body operations for this reason it is advisable in fever reg ons t administer qu nine prophylactically to persons who have had malar previous to operation or on their being wounded

As already mentioned *unfavourable hygienic conditions* play a important part To dwellings in particular Schellong ascribes a gre significance small dirty mouldy dwellings are suitable to the prop gation of the infection the same may be said in regard to damp m huts and newly erected dwellings whereas roomy dwellings provided wit all *hygienic requirements minimise the poss bility of infection* It ma be remarked that mosquitoes exhibit a proclivity for gloomy damp an dark places According to the same author the *wholesale illnesses* wh c are wont to appear where earthworks of a large extent are carried o may be attributed amongst other favouring circumstances above all t a faulty condition of the dwellings and to bad food Examples of suc *occurrences are afforded by the construction of Wilhelmshaven* the co struction of the railway in South Russia and the build ng of the Panam canal

The predisposition to malarial attacks is increased by nothing mor - persons wh fice to cau bath a col residence es of illnes

are relapses caused by malaria parasites retained in the body or ne infections When the illnesses set in a long time after quitting th centre of malar a in malaria free districts on the voyage home or o *arrival in Europe as is frequently the case relapses must* be the caus Schellong himself suffered from relapses twelve and twenty six month after leaving New Guinea having in the meantime resided in places fre from malaria One can therefore never be assured of definite recover until a few years without illnesses have elapsed A few persons indeed who have lived for a long time in malarious regions suffer more severel

om fever on their return to Europe than they did while abroad, and

Plehn made the same observation after treatment by inunction and the se of arsenic It is therefore advisable, when possible, to put off energetic ires until complete reacclimatisation has taken place

In Africa it is a well known fact that travellers do not suffer during peditions into the interior, but only have serious attacks of malaria ter their return to the coast According to F. Plehn, it is the con derable change of climate that causes the outbreak of the disease teudel, on the other hand, seeks to elucidate this fact by explaining that uring the expedition there is an increase of the metabolism, more par cularly an increase of the secretion of sweat caused by the exertion of arches, &c , during the expedition By these means the toxic products the malaria parasites taken into the body are excreted, whereas after ie return to the coast the bodily exertions are over and the secretion of veat less Steudel is inclined to think that the relative immunity of egroes is to be attributed to the lively and quite specific activity of their un, distinctly evidenced by the strong odour of their skins

o investigator has succeeded in transmitting human malarial parasites to animals oes not coincide with the above assertion

SYMPTOMATOLOGY

Malaria gives rise to clinical symptoms of great variety So distinct re the aspects of the disease that it is possible to group them under eadings with pronounced and specific characteristics These are —

(1) Intermittent fever
(2) Remittent and continued fevers
(3) Pernicious fever
(4) Larvated forms
(5) Malarial anæmia and cachexia

The present condition of our knowledge does not permit of an etio ogical division resting on a parasitological basis this would be the most cientific, and must be striven for in the future

I. Intermittent Fevers

Intermittent fevers, which in the more temperate climates represent he principal form of malaria also occur frequently in the tropics In both, *rtian* and *quartan fevers*, originated by the tertian and quartan parasites espectively are observed, and they constitute the principal forms of ialaria observed in those nations that have the least predisposition to he disease (see p 118) Quotidian fever generally called the tertian uplex form, is observed in the more temperate as well as in the warmer limates According to Koch's investigation, *malignant tertian*, first

described by Marchiafava and Bignami in Italy, is the most frequent of tropical malaria κατ' ἐξοχήν [1]

Marchiafava states that 90 per cent of the cases of fever see him in East Africa were of this type This form is distinguished b single attack lasting considerably longer than does the attac ordinary tertian extending almost over two days and exhibiting o *morning of the second day a more or less marked abatement (see fig* The rise as well as the fall of temperature takes place quickly an pyrexia is often higher after the remission than previous to it S the remission be strongly marked or should the temperature even f *normal, which sometimes occurs the fever chart exhibits the appearan*

malarial regions patients coming under medical care have generally viously taken the drug it is therefore comprehensible that hitherto type has not been correctly understood in the tropics, and by most au it is considered to be the quotidian fever which is the most frequent

Fevers with longer intervals such as quintan, sextan &c, are independent forms but come to pass from the fact that a few para remain undestroyed by the quinine and require some time for mul cation sufficient to cause a fresh attack Ziemann considers this op confirmed by the proof that such fevers with long intervals are se or never observed after energetic and sufficiently long treatment quinine Fevers with irregular intervals are frequently observe chronic malarial infection

Prodromal symptoms, according to the statements of experie observers, are less frequent in tropical malaria than they are in Eu When present they co introduce other acute of leaden weight in th work and bodily mov

evenings and night sweats Very frequently the same prodromal s toms and subjective disorders occur in the same person at every at (F Plehn)

The assertion of Trousseau and others that the attacks of usually set in between midnight and midday, most often in the morn *is not confirmed in the tropics*, the attacks are sometimes observe the evening *In malignant tertian the commencement of the* fe according to Koch, almost without exception occurs at midday or du the first hours of the afternoon

The *stage of rigor* is often insignificant, or even entirely ab Schellong, in New Guinea, observed that rigors were more frequer

[1] ... a good description of malignant te ... eodem modo, quo quartar ...

Malays and in Melanesians than in Europeans In children, the stage chill is announced by coldness of the extremities, pale complexion, an cyanosis of the lips and nails During the attacks of fever the childre are very restless toss from side to side, do not sleep and cry almos continuously

Headaches are usual, but their location varies Pains in the back and lumbago are frequent and are not rarely connected with neuralgia of the sciatic and crural nerves Kohlbrugge after attacks of fever, observed *pains in the extremities* more particularly of the legs, which he attributed to the presence of malaria parasites in the bone marrow, these pains lasted a few days or persisted for weeks

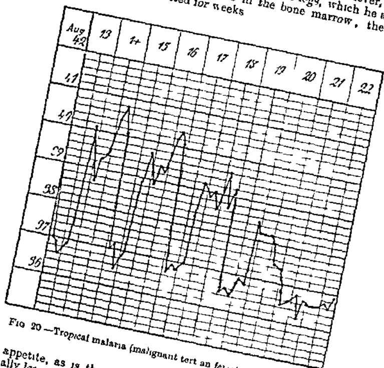


Fig 20 —Tropical malaria (malignant tert an fever), after R Koch

The appetite, as is the case in all forms of malaria is disturbed casionally loss of appetite forms the only symptom of malarial infection Martin)

Often *retching* and *vomiting* and still more frequently *diarrhœa* are sent, which tend to quickly reduce the patient's strength Affections the stomach and intestines appertain to a certain extent as specific nents in malaria According to Ascoli these are brought about by the mation of toxic materials through the digestive tract

n India sanguineous vomit and sanguineous diarrhœa are some s observed and these may even prove fatal (Mason Clarke) Other orrhages likewise, such as bleeding from the nose pulmonary hæmor s, menorrhagia and petechiæ may occur (Kohlbrugge)

metimes the sufferers complain of a *feeling of oppression in the* *colds in the head* and *bronchial catarrhs* are sometimes observed

The *enlargement of the spleen* is frequently quite inconsiderable In Cameroon F Plehn found that the spleen in the majority of cases was not larger than in the cases of typhoid observed in Germany, often even very much smaller Amongst the remainder distinctly palpable tumours were an exception even in persons who had suffered much from fever Schellong observed *dysuria* in nearly all patients After the attacks acute *polyuria* frequently sets in with an increase in the secretion of urea uric acid phosphoric acid and of chlorides conveying the idea of the elimination of the malarial virus from the body (Mossé)

The statements of authors [illegible]
minuria differ considerably [illegible]
account F Plehn found [illegible]
regularly but slightly only in [illegible]
which Plehn attributed to a [illegible]
illness In [illegible]
frequently as [illegible]
is but rarely [illegible]
In Baltimore [illegible]
autumnal fev[illegible]
nephritis in [illegible]
part in the [illegible]
where malari[illegible]
examinations [illegible]

Often in intermittent as well as in remittent fevers *herpes* and *urticarial eruptions* occur In rare cases a few observers such as Franck and Empis (according to Roux) and lately Rasch, have observed that the urticaria affected the larynx causing dyspnœa with stridulous breathing and oppression (urticaria laryngea malarica) *Erythema nodosum* has been observed (Boicesco, Moncorvo) attacking more especially women and children During the attacks of fever the nodules become painful swell and become reddened and again become paler towards the end of the attack

The intermittent fevers according to Davidson, often assume a sthenic character in healthy Europeans who have only been in the tropics a short time evidenced by violent rigors severe vascular reaction intense headaches violent delirium and severe bilious vomiting In weak badly nourished natives on the other hand an *adynamic* condition obtains which is more dangerous than the sthenic condition , the rigor is slight or entirely absent the fever is low the skin pale the pulse slow, weak and irregular giddiness stupor and great prostration are present and the patients are also much exhausted during the intervals

2 Remittent and Continued Fevers

Europeans in particular are often liable to remittent and continued fevers in the tropics These probably always develop from malignant tertian fever and it is possible that neglect and the influence of unsuitable treatment by quinine have something to do with it at times it is observed that intermittent fever precedes and follows remittent fever The transmission is effected by the prolongation and conjunction of single attacks or by these being superimposed and therefore mixed one with the other or finally that they multiply in consequence of the presence of several generations of malaria parasites of various ages

Certain intermediate forms occasionally occur, and the temperatures exhibited are occasionally so irregular that one is embarrassed how to refer them to any definite type of fever Rigors and splenic enlargements are frequently absent

Other symptoms of the disease are also very changeable The subjective appearances are often remarkably few For the most part they consist of gastric disorders headaches and a feeling of general indisposition loss of appetite pain in the epigastrium heartburn nausea eructation vomiting Diarrhœa is rarely absent and may become dangerous especially in children Slight jaundice often sets in (febris remittens biliosa) Moreover slight bronchitis is a frequent accompanying symptom In longer lasting cases bleeding from the nose and other hæmorrhages especially in the skin, may be met with In serious cases the fever assumes a typhoid or adynamic character stupor delirium, restlessness obstinate insomnia or on the other hand torpor sets in, the tongue becomes dry and foul the torpor passes on into coma or the temperature falls to subnormal the patient becomes apathetic and the most severe *prostration ensues constituting so called pernicious fever* (see p 128)

The period of the duration of remittent fever fluctuates between three days and three weeks sometimes it even lasts longer Towards the termination of the illness the remissions are longer and finally become actual intermissions A sudden fall of temperature however, may also take place

Martin during convalescence observed several times a remarkable defect in the memory which was mostly only arrested by a voyage to Europe Amongst the Chinese the same author frequently saw serious

it fevers and good
ge of climate The
interesting namely
that recovery from an attack of remittent fever leaves a certain immunity from further malaria, in contradistinction to intermittent fevers Typho malaria is also to be counted in this group of malarial fevers

Typho-malaria

Synonyms *Malaria typhosa Malaria typhoid Typho-malarial fever Fièvre typho malarienne Fièvre typho-palustre Fievre typho pal id enne*

T

distinct part in its ætiology It is therefore observed to appear by predilection in campaigns

Typho malaria is distinguished by the fact that in addition to remittent or intermittent fevers suddenly setting in with rigors *typhoid symptoms* appear, these consist of diarrhœa pain in the cæcal region, flatulence a dry brown tongue roseola more or less marked unconsciousness and delirium pain may be observed in the hepatic region with enlargement of the liver and even slight icterus The vomiting of bilious material is moreover a fairly constant symptom Schellong also mentions hiccough as a frequent and troublesome symptom The period of the illness varies between one and three weeks or more Death may ensue from coma or in consequence of perforation of the intestine, followed by peritonitis

According to my personal observations made in Japan, I can distinguish two forms of typho malaria. The cases appertaining to the first form resemble simple typhoid during the first weeks. During the third or fourth week the fever generally becomes intermittent, and severer attacks of fever, mostly coming on in the afternoon or evening and terminating in the night or morning, set in, these attacks are often introduced by rigors, followed by heat and perspiration, and may be repeated in a regular or irregular type.

In the second form, the fever from the commencement exhibits a ... e fall of tempera... perspiration, while

enabled to confirm on my own person, having suffered from a similar attack of typho malaria in Japan in November, 1879.

As to the remaining symptoms, the intestinal disorders are usually ... servations, the case in Japanese ... The intestinal symptoms are ... ie cerebral symptoms, as a rule, ... never missed seeing roseolar spots, they usually set in about the middle of the second week.

In the cases observed by me the disease always had a favourable termination, the fever generally ceasing in the third or fourth week. Most of the American observers of typho malaria also state that death seldom resulted therefrom, while, on the other hand, a high mortality is reported by other observers. In thirty cases recently compiled by Lyon, the mortality was given as 33.3 per cent.

I found that quinine had no influence on the duration of the fever.

There is no doubt that various kinds of illnesses are confounded with typho malaria. In actual typho malaria—and to this type belong the cases observed by me in Japan—there is a *combination* of *malaria* and *typhoid*, the sufferers being either simultaneously attacked by both illnesses, or in such as have previously had malaria the malaria parasites latent in the body are roused up by the appearance of typhoid and the character of the disease is modified. Malaria is indicated especially by the course of the fever and the great enlargement of the liver and spleen, typhoid is indicated by the roseolar rash and also by the resistance to quinine. Sometimes the malarial and sometimes the typhoid character predominates, so that the French distinguish *malaria-typhoide* and *fièvre typho malarienne*. The accounts of the disease, therefore, vary considerably. The simultaneous existence of two infections, the possibility of which has been scouted, by no means stands alone, the simultaneous occurrence of measles and scarlet fever, scarlet fever and small pox, typhoid and recurrent fever, &c., has been repeatedly observed.

Lately the pr... has been furnishe... demonstration of... intestinal canal ar... Gruber Widal serum reaction in typho malarial patients.

The term typho malaria is, however, frequently applied erroneously to pure malarial fevers which have a course more or less resembling typhoid, and also to simple cases of typhoid. A. Plehn, in Cameroon,

the stools, and when the Gruber Wid ıl s serum re action ¹ is elicited

Besides the above mentioned fevers, a series of other remittent and continued fevers

lacks confirmation

serum reaction test does not seem to have been applied

more to that of remittent found diploco cı of varying size some oval, some round and some crescent shaped in the blood these exhibited slow movements He was never

The significance of the Gruber Widal reaction is somewhat limited inasmuch as it is exhibited only in the second week of disease while on the other hand it is at ll to be seen months and even years after the disease, and in some rare cases is not to be observed at all The negative result of the proof by agglutination does not therefore exclude typhoid while the positive result affirms it

¹ Brit Med Jo...

China for the half year

are burn r
flushed face
the back
symptoms
term nate r

o ao
Perhaps the m crob olo$_{\circ}$ cal nvest gat ons of the future w ll eluc date the nature of these illnesses

3 Pernicious Fever

(Febres intermittentes perniciosæ s comitatæ)

Under certa n exceptional circumstances when malarial d sease affects children aged people or persons who l ave been enfeebled in other ways

Arch de Méd Nav 1897 December p 454
[2] Medical Age 1895 Nos 11 and 12 refer to Cbl f inn Med 1895 No 52 p 1 367
[3] Journal of Tropical Medicine December 1898 p 141

benign forms may take an unfavourable course In discussing pernicious fevers however such cases are not taken into account The term pernicious fever is employed to indicate those cases which immediately assume excessively serious symptoms which endanger life and may lead to death in a few days or even hours The symptoms are induced partly directly through malarial intoxication partly through mechanical disturbances in the circulation of the blood and are manifested either by a remarkable intens ty of the usual malarial symptoms or by d sturbance of important organs In the latter case perhaps mixed infections have some thing to do with the condition the nidus for other micro organisms being prepared by malaria parasites and their toxins

The pernicious symptoms sometimes set in quite suddenly during the course of a seemingly mild attack of intermittent fever a pernicious attack immediately following an ordinary attack which however only causes death after several relapses sometimes the change from benign forms into malignant takes place by means of gradual aggravation of the symptoms of disease

The pernicious forms are mostly originated by the *parasites of malig nat t tert an fever*

The type of fever may vary considerably being sometimes intermit tent somet mes—and this is particularly the case in the pernicious forms of the trop cs—remittent continued or irregular In rare cases the

influence on the *form* of pernicious fever In hot months the nervous system and the d gestive canal are by predilection the seat of the lesions, and in cold months the respiratory organs are affected The disturbances frequently have their seat in organs that are or have been affected patho logically in some way or that may have been injured as an instance cerebral symptoms set in subsequent to injuries of the skull through a fall or fit after sunstroke emotion or the partaking of alcohol to excess (Hertz)

Certa n forms o

the choleraic form

Guinn the algide

gascar the comato

hæmoglobinuria is the chief representative of the pernicious forms of malaria

The mortality in pernicious fevers varies according to place and season but it is always high

Pernicious fevers are as a rule preceded by attacks of milder forms of malaria they are not generally observed as primary illnesses The

is superficial and slow, the voice becomes weak and hoarse, but con sciousness is maintained The algidity may set in with intermittent,

remittent, or even sub continued fever, though itself not intermittent Once it has set in it terminates within a few hours, either with recovery or death, the latter being the rule The algide is one of the most treacherous forms of malarial infection

and accelerated, respiration is superficial and irregular, and the urine is frequently suppressed Death frequently occurs during the first attack

(3) *Malaria collapse* (febris intermittens perniciosa syncopalis) —A more or less acute condition of collapse sets in, sometimes during the stage of initial rigor, sometimes it follows upon several typical attacks of intermittent, or sometimes even during the course of an attack of remittent or irregular fever The patient faints away, and the pulse becomes accele

may rally when perspiration appears, generally however, only to succumb to one of the subsequent attacks

(4) The *comatose form* (malaria comatosa, febris intermittens comatosa)

present The pulse in this condition is very frequent, not coinciding with the height of the temperature, respiration is likewise quickened, becoming at times bronchial, at times sobbing, and occasionally even exhibits Cheyne Stokes' phenomenon (Schellong); the pupils are fixed and are sometimes dilated, sometimes contracted, while the corneal reflex is generally maintained The coma may last several hours, or for one or even several days, may exceed the period of fever Consciousness then returns, often with the appearance of profuse perspiration, though the patient is still confused and feeble, and complains of headache and giddiness which either gradually decrease or again increase before a fresh attack In other cases the coma deepens into death If recovery ensues disorders, such as a certain obtuseness, disorders of speech, paresis of single limbs, contractions, &c, may remain for a considerable time, or even during the entire life

or meningitis caused by sunstroke It has also been observed that evidence of malarial infection follows undoubted heat stroke after consciousness has returned

The apoplectic form is a variety of the comatose form in which the coma sets in suddenly, and occasionally also paralyses, mostly hemiplegic, more rarely monoplegic, are observed, these usually appear while full

consciousness is maintained According to Landouzy hemiplegia is very frequently connected with aphasia In some cases the paralyses come and go with several consecutive attacks, being thus actually intermittent

(5) *The Delirious Form* —After being preceded by the usual head aches, giddiness, singing in the ears, restlessness and sleeplessness, delirium which exhibits every transition from the mildest form to the most violent maniacal attacks sets in and in serious cases may last a few hours Death may ensue from sudden collapse setting in during the attack, or by the delirious form assuming a comatose type In cases with a favourable termination the patient falls asleep and the sleep leads to recovery A repetition of the attack usually has a fatal termination

Mild degrees of delirium are sometimes observed at the climax of the fever after mental exertions or in drunkards without any importance being attachable to them

(6) The *convulsive form* (febris intermittens eclamptica, epileptica, cataleptica tetanica)

In children during the hot stage of fever, convulsions are frequently observed and these are generally accompanied by somnolence or coma In tropical malarial regions malaria is the most frequent cause of eclampsia in children (Thornhill) In lying in women also the pure convulsive form likewise occurs (Roux) otherwise however it is very rare in adults In the comatose form, on the other hand sometimes trismus, squint cramp of the pharyngeal muscles tetanic contractions as also clonic spasms of the extremities are observed *Febris intermittens hydrophobica* also belongs to this variety and attends every attempt to swallow water or the mere look of water causes tonic spasms commencing in the pharyngeal muscles and spreading gradually over the face, neck, and finally the entire body (Watson)

also by hiccoughing and vomiting The abdomen in the meantime is

febris intermittens per
g to Mart n, has a course
ears a great similarity to
Asiatic cholera and mostly ends rapidly in death The symptoms

... pupils dilated the lips and nails become blue, the skin is covered with cold clammy sweat the extremities and abdomen feel as cold as ice the pulse is small and frequent the breathing accelerated oppression and præcordial agony are present the secretion of urine is diminished or suppressed, the voice fails painful convulsions of the lower extremities set in and death takes place apparently by asphyxia Consciousness is often maintained until the last moment

This form occurs in cachectic persons and also in patients who have never previously suffered from malaria In persons suffering from cachexia it is according to Martin absolutely fatal, while of the others about 25 per cent under suitable treatment may be saved

(9) The *dysenteric form* (malaria dysenterica febris intermittens dysenterica) This form also occurs beyond the tropical zone It has been observed by Debio in the lower regions of the Danube and by myself in Japan It is generally introduced by diarrhœa, more or less serious, which may have been brought on by chill, errors in diet, &c In one of my cases a vermifuge (decoctum granati) was the incidental cause The stools at first are copious, fæcal, mixed with blood and mucus and their evacuation is attended by tenesmus During the course of the disease they become more frequent with increasing tenesmus, while the fæcal material decreases, and the stools at last consist merely of blood and mucus The average number of stools in twenty four hours is twenty or more, in serious cases they become so numerous that they can no longer be counted In addition there are severe pains along the tract of the colon, these being worse in the region of the umbilicus, the pain is increased before each evacuation and by palpation of the abdomen I was not able to confirm the statement of other observers that the

be present

If no improvement in the condition is effected by suitable treatment or change of climate, the patients rapidly become emaciated, and present a piteous appearance, which is not inappropriately compared by Werner to the appearance presented by atrophic sucklings The evacuations still consisting of blood and mucus, become discoloured, serous and of a cadaverous odour The patients finally perish from exhaustion, after

attacked by this
with them more

ia, there is the question, in at least a part of the cases, of a mixed infection A satisfactory reply to this problem will, however, not be possible until the ætiological factors of dysentery are settled

(10) *Pneumonic* malaria (malaria pneumonica, febris intermittens pneumonica) This form, also, is not peculiar to the tropics, I have seen it not only in Japan but even in Germany, where, as assistant in

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1,
with shortness of breath pains in the chest, cough and expectoration Sometimes already, on the first day of disease, a pneumonic infiltration is perceptible by percussion and auscultation The lower lobes appear, by predilection, to be attacked In a case examined by me *post mortem* the entire right lung and a large portion of the left lung were affected The expectoration is sometimes mucous, sometimes purulent, with a mix

ture of blood, sometimes as occurred in my cases, it has a characteristic pneumonic appearance. During apyrexia occasionally an abatement, or ... subsidence of the symptoms, subjective and objective, ... they remain stationary and ... The disease is usually

... not

of pernicious ...
tinued, the local ...
delirium, tremor ...

... its who have died of ... the autopsy reveals ... the other symptoms ... mmends the minute ... of the lungs in such cases

Opinions are divided as to the nature ... ing to one view it is a question of a particular localisation of malarial infection. According to the other view it is a complication, the predisposition to which is furnished by malaria. According to F. Plehn the body, the powers of resistance of which have been damaged by the long- ... of malarial fever, easily falls victim to a number of other ... to the body by external ... ffords an opportunity for ... latent

... expression of the ... as ... ver ... nce ... l be

... experience, there is

notwithstanding the fact that during [illegible] of the [illegible]

11 *Malarial pleurisy* (febris intermittens pleuritica) occurs more rarely than pneumonic malaria According to Hertz it is characterised by symptoms of dry pleurisy (pains dry cough fremitus) which appear during the attacks of fever

In German East Africa according to Steudel dry pleurisy occurs as a complication of blackwater fever

12 Hæmoglobinuric Malarial Fever or Blackwater Fever

Synonyms Bilious fever malaria biliosa hæmoglobinuria Febris intermittens biliosa Schwarz[illegible] fever Hæmaturic [illegible]al fever F[illegible] naturique F[illegible] phénurique F[illegible] a climat s F[illegible]

Blackwater fever so called by the symptom most pronounced in the eyes of the laity namely the secretion of blackish red urine has lately been the subject of numerous publications According to these it would appear that the geographical region of distribution of the disease is a fairly large one (see chart I) Its principal distribution however is found along the flat coasts of tropical Africa on the west as well as on the east coast It is by no means a new illness in these regions though of late years it has increased in frequency In the reports of the French Colonial medical officers it can be traced to the twenties of the nineteenth century It occurs in Nossi Bé Madagascar and Mauritius in Asia Minor (Smyrna and vicinity) Siam Cochin China while in India it only

curs in a few particularly notorious malaria centres of Assam and Upper Burmah, as also in the Terai, at the foot of the Himalayas which has an unenviable notoriety in consequence of the uncommon malignancy of its malarial fevers (F Plehn) It occurs in isolated cases in Java (particu larly in Pulu Bras, Onrust, in Tjilatjap and Tandjok Priok) in Atjeh and in New Guinea A fever with the same signs and symptoms is also met with in the Southern States of North America in the West Indian Islands, where it frequently is confused with yellow fever in Central America Venezuela Guiana in a few districts of Brazil and in Uruguay (Monte video) It has also been observed in Europe in a few river valleys of Spain, in some parts of Italy, especially in Sicily Sardinia, in the Roman Campagna as also in Greece where, during the construction of the canal in Corinth it wrought great havoc amongst the labourers

Blackwater fever is by most authors reckoned as a variety of malaria, and in this opinion I coincide It appears in the most notoriously malarial regions, and skilled observers such as Van der Scheer F Plehn A Plehn, Powell &c, have found the small unpigmented seal shaped malaria parasites peculiar to the tropical forms of malaria in the blood of blackwater fever patients in most if not in every case The large tertian and quartan parasites have also been observed a few times (by A Plehn, Koch Smith &c) Opinions deviating from the above are expressed by Yersin Sambon and Koch Yersin in two cases observed in Madagascar found no malaria parasites but discovered a fine bacillus which he was able to cultivate on gelatine and which had a toxic effect on rabbits and mice he therefore came to the conclusion that blackwater fever had nothing to do with malaria There has however, been no confirmation whatever of this discovery Sambon withou however, being able to support his views by means of his own investiga tions, is of opinion that blackwater fever is a specific d sease which is identical with, or nearly related to the Texas fever of cattle (see page 110) Koch quotes forty one cases of which only eighteen exhibited malaria parasites On these and the following further grounds Koch is of opinion that this disease does not appertain to the group of malaria fevers When malaria parasites are present their number is not pro portionate to the hæmoglobinuria as would be expected by analogy with Texas fever In malaria the parasites are very numerous without hæmo globinuria being originated and on minute comparison between attack of malaria and those of blackwater fever it will be found that essent clinical differences are exhibited Finally judging by the fact th blackwater fever may be connected with two entirely different ki of malaria namely ordinary tertian fever and tropical fever Koch co to the conclusion that this disease is not related to malaria Ko investigations stand in direct opposition to those of F Plehn This in tigator, who has had a wide experience in the sphere of the ætiolo malaria states the following facts in his recently published work Cameroon Coast In the medical history of 40 cases of black fever observed by him in Cameroon and German East Africa state were given as to the result of the examination of blood for m parasites in 33 of these cases In 31 the results were positive negative Apart from the conditions that obtained before the ance of blackwater fever or after its disappearance the result nation were as follows —

on June 8 1895

Day of Disease	Number of Patients	
	Positive	Negative
First	16	3
Second	2	7
Third	—	4
Fourth	—	1
Fifth	—	1

Taking these numbers into consideration, and in spite of Koch's weighty authority as to the question of the relation of blackwater fever to malaria I do not consider his verdict to be conclusive

A Plehn has pointed out that in this disease the malaria parasites are only to be encountered *at the beginning of the illness* as, in all cases without exception these parasites perish in the plasma by being deprived of their host through the disintegration of the blood corpuscles which takes place in blackwater fever in consequence, malaria parasites may disappear entirely after only twelve hours As regards the *influence of the seasons* on the occurrence of the disease, it is especially towards the end of the rainy season in most tropical countries that cases of illness make their appearance Coinciding with this statement Bérenger Ferand reports the same condition in Gorée, Carmouze in the French Soudan, F Plehn in Cameroon, and Corre in the island of Nossi Bé on the north west coast of Madagascar On the other hand Hébrard asserts that blackwater fever is seen on the Ivory coast and cannot be said to be dependent on the condition of the weather, Gartner reports the same as regards German East Africa Sometimes blackwater fever appears in epidemic form and this according to F Plehn's opinion is always attributable to marked climatic or telluric changes

The disease is mostly observed in persons who have made *a long stay in a malarial region* with or even without a large number of fevers to his credit It seldom occurs within the first six months' stay, but F Plehn saw isolated cases in which blackwater fever broke out only a few weeks after arrival According to Crosse the disease seldom occurs after the third year in the tropics

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wat women than in men,

this that there are fewer women than men in the countries where the disease occurs, and they are *less exposed to the influence of malaria than are the men* *Children* do not enjoy immunity Fisch observed the disease in two children aged respectively 14 months and 2½ years

According to F Plehn an *individual predisposition* to frequent attacks exists in the same manner as malaria possesses the tendency to reappear with the

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who had gone through ten or more attacks, and according to his experience after having recovered from the fourth attack the immediate danger of the attacks has been overcome

It frequently happens that blackwater fever recurs even after *depar*

ture from the malarial region under the influence of change of climate different manner of living and on the voyage home or even after arrival home Plehn points out that under these circumstances numerous Africans from the west coast fall victims to this disease on their way or on reaching home Crosse and Pakes observed a case in London of a patient who had returned from Nigeria a month previously and had there suffered severely from malaria but had never had blackwater fever

As incidental causes all weakening influences that may act as predisposing causes in malaria come under consideration such are chills bodily exertions mental excitement rapid change of climate (as a quick journey to a hill station or a quick voyage home to Europe in winter) working in the sun excesses in Baccho et Venere parturition injuries &c

Quinine forms another and very frequent incidental cause In the different countries the outbreak of hæmoglobinuria or blackwater fever has been observed by various investigators (Tomaselli Karamitsas Pampoukis and Chromatianos) to immediately follow the use of quinine even in quite small doses Of 43 cases of blackwater fever which came under F Plehn s observation in Cameroon 24 positively broke out a few hours after the administration of quinine and of 55 cases treated by A Plehn in the same place 48 of the attacks were directly caused by quinine Most of the attacks set in two to four hours after the administration of quinine in rarer cases probably in consequence of retarded absorption the attack commences later even as much as ten hours after

For this reason Koch has made the assertion that blackwater fever as a rule is solely *quinine poisoning* without malaria taking any part in the condition Baccelli made the same assertion in regard to malaria hæmoglobinuria in Italy Koch also maintains that in those cases in which the illness had not been preceded by the use of quinine food drink or other substances conveyed into the body to which sometimes the organism exhibits a remarkable idiosyncrasy in the tropics may exercise a similar effect on the red corpuscles as quinine itself Koch s opinion has however hitherto found but few supporters and for the following reasons —(1) Blackwater fever only occurs in notoriously malarial regions (2) A number of reliable observers have confirmed the presence of malaria parasites especially at the commencement of the illness (3) It is occasionally observed in patients who have certainly not taken quinine immediately or even for some time previously Quennec in the Soudan saw the only person a doctor who on principle took no quinine die of black water fever Carre in Africa also knew two persons who would not take quinine one of them died from malarial cachexia the other from blackwater fever (4) Blackwater fever is only endemic in certain malarial countries but in other countries where quinine is taken to as great an extent it does not exist In India where malaria is very frequent and occurs in all forms and where not alone malaria but every kind of feverish disorder is treated with large doses of quinine—daily doses of 3 0 to 5 0 being quite usual—blackwater fever is practically unknown (Crombie) The same condition prevails in British Guiana In Algeria neither Laveran nor Brault ever saw a case nor was the disease observed by De Brun in Syria although in both the countries mentioned malaria is very prevalent and a great deal of quinine is taken (5) The same person may at times develop blackwater fever after a small dose of quinine whereas a few days previously or subsequently he can take considerably larger doses without any injury to himself Exceptionally the observation is made that in certain persons hæmoglobinuria is origi

nated even by small doses of quinine In such cases it may be a question of congenital or acquired idiosyncrasy (6) Although the use of quinine is by no means confined to malaria, blackwater fever, with remarkably few exceptions, only occurs with malaria

Only three such cases, two relating to typhoid patients and one to a leukæmic patient, have ever become known to me, these were observed by P Moscato and were mentioned in response to Meuse's enquiries on the blackwater fever question Obviously in these cases there was idiosyncrasy

For these reasons, according to my opinion one may conclude that malarial infection plays the principal part in the genesis of blackwater fever, and that the ætiology of this disease may probably be explained in the following manner —

In certain particularly notorious fever regions a constant destruction of red blood corpuscles takes place under the influence of chronic malarial infection In consequence of the continued and unusual demands which are made on the blood forming organs these no longer grow, so that they partly yield a product weakened in its capacity for resistance A new invasion of parasites suffices—even of the otherwise benign tertian parasites—with the virus formed by them alone, or in conjunction with another poison introduced in the system, namely, quinine (exceptionally the latter alone) to cause a wholesale destruction of red blood corpuscles infected and non infected, and thus to originate blackwater fever A Plehn explains that as, in this process of disease, the least valuable blood corpuscles perish, a large dose of quinine can be borne a few days later without exercising a deleterious influence

In *this enormous destruction of red blood corpuscles* the danger of black water fever consists The *hæmoglobin* released in great quantities is partly taken up by the kidneys and *secreted with the urine*, and partly invades the circulation of the portal vein and becomes transformed into biliary pigment in the liver The consequence is a superfluous production of bile As the liver is unable to completely excrete this a portion finds its way through the lymphatic vessels into the blood and in this manner *icterus* is originated (*Senator s cythæmolytic icterus*) Hæmoglobinuria and icterus are, therefore the principal features of blackwater fever The accompanying type of fever varies Sometimes according to A Plehn it is tertian, sometimes quotidian most frequently it is of an irregular intermittent or remittent type, with only very short periods of apyrexia or remissions

Prodromal symptoms often precede the outbreak of the disease, and are similar to those that are apt to prelude malarial fever They consist in a sensation of indisposition lasting for several days, accompanied by lumbar pains or pains in the region of the kidneys, a dragging in the limbs, general feeling of fatigue, loss of appetite, disinclination for work &c Sometimes the disease breaks out owing to some incidental cause, sometimes spontaneously during the course of a simple uncom plicated malarial fever, or sometimes under the influence of certain external causes

Fisch in many cases on the Gold Coast, observed that the disease was preceded by fevers of an unimportant character setting in every week, or more rarely every fortnight

The actual commencement of blackwater fever is usually characterised by a severe rigor, sometimes persisting several hours, the temperature mostly rises rapidly and soon attains to 40° or more Cases, however, occur in which 38° is either not exceeded, or only by a few points, or

it may even run an afebrile course (F. Plehn). The patients complain of a severe sensation of oppression in the chest, and are tormented by restlessness and great terror. There is great feebleness from the very commencement and the patients are possessed by overwhelming low-spiritedness and hopelessness The hot stage usually only lasts

At the commencement of the illness violent and frequent attacks of bilious vomiting set in, accompanied by abdominal pain, so that all the drink taken by the patients to quench their raging thirst is generally vomited Diarrhœa may also set in, the stools are always bilious, and in rare cases assume a blackish brown tar like consistency, in consequence of the infiltration of hæmoglobinuric serum into the intestine (F. Plehn), similar masses may also be vomited (Fisch) In other cases there is constipation at the commencement The *liver* is frequently *enlarged* and painful or pain is elicited by pressure, particularly in the region of the gall bladder *Enlargement of the spleen* is still more frequent, but this may be absent or unnoticed in consequence of severe flatulence

Icterus sets in within the first twenty four hours In serious cases it increases rapidly, so that after a few hours the patients are of a deep citron yellow colour Mostly, however it is not very severe and disappears again in a few days, being replaced by a complexion of a livid hue

The *urine*, sometimes even before the outbreak of the fever, exhibits hæmoglobinuric contents, and according to the degree of hæmoglobin its colour is like claret, coffee, porter or sherry, or of a blackish brown hue It is opaque, and the froth made by shaking it is generally distinctly red or yellow If allowed to stand a plentiful sediment forms which, microscopically examined, is found to contain vesical epithelium, kidney epithelium, grains and flakes of hæmoglobin, a few hæmatoidin crystals, hyaline or granular epithelium and hæmoglobinuric cylindrical casts In addition to these there are occasionally seen granular cells, small masses

is normal A Plehn, on the other hand, calls attention to the extra ordinary lowness of the specific gravity when the quantity of organic material is taken into account The albumen, computed according to Esbach's method, varies between 05 and 2 per cent Heller's blood test always exhibits positive results spectroscopically, and oxyhæmoglobin or methæmoglobin, as also urobilin can always be confirmed in the blood (Berthier). Biliary pigment is not a constant constituent of the urine in blackwater fever, but has been confirmed in a number of cases by

irritation exercised on the mucous membranes of the bladder and urethra by its pathological constituents The quantity is usually diminished, and complete anuria may set in. Corré observed priapism in a few cases

Louvet, in one case of blackwater fever, confirmed the presence of indican in the urine

Anæmia of a high degree is always extant The hæmoglobinuric contents were found by Plehn to be reduced to 40 or 60 per cent On *microscopical* examination this investigator found numerous macrocytes and so called Ponfick s shadows less numerous microcytes and poichylocytes and blood corpuscles always containing nuclei these are signs of commencing regeneration On the other hard, no p gmentary materials were found and the serum in the most serious cases, proved to be slightly reddened by dissolved hæmoglobin

Sambon observed pronounced leucocytosis which commenced with the attack and out lasted it a long time

The bodily strength of the patients rapidly diminishes and they become emaciated in a few days The pulse becomes small, irregular and very frequent the heart sounds are unnaturally loud, and violent attacks of dyspnœa set in which (as also the paræsthesia and hyperæsthesia consisting in itching and a feeling of numbness in the fingers and toes) may be attributed to the advanced anæmia Sometimes, also *hæmorrhages* from the nose gums, in the skin &c , are observed Frequently, in consequence of the defective activity of the kidneys cerebral symptoms severe headaches somnolence, delirium, unconsciousness set in and death may ensue from *uræmia*

In other cases the patients die in consequence of cardiac insufficiency formation of thrombus in the heart, embolism (F Plehn) or through the serious

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In a favourable case of blackwater fever the icterus and hæmoglobinuria disappear rapidly but the urine remains albuminous for days and weeks, the irritation of the pathological secretion having caused nephritis Indeed the patients only recover very slowly the blood corpuscles destroyed being only replaced gradually Often the temperature at the commencement of convalescence is subnormal After recovery from blackwater fever the patients not rarely remain free from malaria for weeks or even months without taking quinine

In the mildest cases of blackwater fever only one or more attacks of fever lasting a few hours occur with the hæmoglobinuria

The *percentage* of *mortality* is given differently by different authors it is therefore evident that it varies according to time and place According to Michel s observations (N America) the mortality averages

E Africa) 21 per cent
according to Steudel
F Plehn (Cameroon)
(Greece) 6 6 per cent

Fisch (Gold Coast) asserts that blackwater fever has become much more frequent during recent years than it was ten or twenty years ago but that it has assumed a more benign character about twenty years ago almost all the patients succumbed whereas at the present time only about 20 per cent die

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(13) *The rheumatic hæmorrhagic form* observed by Heinemann in Vera Cruz (Mexico) in which after the attack there are hæmorrhages into the joints subcutaneous tissue and bleeding from the nose and intestines

4 Masked Forms

The masked forms of malaria are characterised by a remarkable diversity There is hardly a known disorder which malaria may not incidentally simulate The form of the mask depends largely on individual conditions any irritated or weakened organ or part becoming the seat of trouble The masked forms run sometimes a quite afebrile course sometimes they are accompanied by more or less pronounced symptoms of fever Splenic enlargement is not always present Like the malarial fevers they often possess the peculiarity of appearing periodically and at regular intervals Frequently an attack of masked malaria sets in instead of the expected fever or on the other hand the mask so to say is thrown off and a veritable attack of fever develops

Our knowledge of the malarial counterfeits are to a great extent founded on old observations Hitherto but few blood examinations have been undertaken in this direction If malaria exists primarily the presence of malaria parasites in the blood will be the criterion—and this to stand good for the masked forms as well as all the others—and the extent of these obscure ailments will be found to be considerably decreased

fever the testicles and epididymis enlarge equally and frequently cannot be *isolated one from the other, while simultaneously there is* some effusion into the tunica vaginalis The pain and fever quickly disappear on administration of quinine, while the swelling requires a longer time (three to four weeks) to abate Without quinine suppuration may set in Not rarely atrophy of the testicle or thickening of the epididymis is left, and hydrocele persists *In the* German navy also (East Asia, Africa) this affection has been frequently observed Ziemann, in Cameroon, saw a mild case with parasites in the blood, and this observer is of opinion that the sporulation of the parasites of tropical malaria takes place in the internal organs, because perhaps the infected blood corpuscles, having suffered certain changes, are retained in the capillary network, he is inclined to attribute orchitis also to this purely mechanical influence Fayrer reports that in India, under the influence of malaria, hydrocele frequently develops

Diarrhœa and necrosis of the cornea are sometimes encountered as accompanying symptoms The disease is difficult to treat, recovery very seldom takes place Rasch, however, achieved a successful recovery in seven weeks in a case in Siam, which he treated with phenacetin and quinine

5 Malarial Anæmia and Cachexia

(Cachexie paludeenne)

A *primary* and a *secondary* malarial anæmia and cachexia are differentiated The latter is developed in consequence of acute, frequently *repeated attacks of malaria* Exceptionally it may set in after the first attacks of fever, when it may cause death in a few weeks The severity and the number of

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What would appear to be primary malarial anæmia and cachexia, occurring without definite attacks of fever, is a very insidious affection In many fever regions the whc ... the stamp of cachexia

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weak, and are incapable of doing any active work They perspire profusely, sleep badly, or on the contrary exhibit marked sleepiness,

the region of the stomach The appetite is disordered or loss of appetite alternates with morbid hunger diarrhœa is often present and icterus occasionally Usually but not always there is a splenic enlargement wh ch is usually very extensive The spleen in recent cases is also occasionally sensitive to pressure it is apt to be accompanied by a sensation of pressure or pricking The *liver* also is frequently considerably *enlarge l* and sensitive

Malarial melanodermia may also appear in the form of roundish spots of a blackish brown colour and varying size they appear on the trunk and limbs during the attacks of fever and are originally of a red colour

During the further course of the disease the patients become still weaker and the anæmia is gradually transformed into cachexia *Dropsy* sets in and also *albumi iuria* the latter in consequence of chronic parenchymatous nephritis Hæmorrhages may preva l—subcutaneous hæmorrhage and more rarely bleeding from the female genitals the stomach and intestine have been recorded Occasionally a scorbutic cond tion of the gums occurs

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number of months pregnancy has lasted (Goth) Sterility according to Weatherly is also a frequent consequence of malaria

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In patients very much reduced in strength *necrosis of the cornea* may occur, wl ich in the course of twenty four hours may lead to the total loss of both cornea (*keratomalacia ex malaria*) This affection accord g to Martin s experience is so mal gnant that the partial preservation of the power of vision can only be hoped for in young and strong persons by means of quinine and local treatment Should only one eye at first become affected its immediate enucleation may succeed in arresting the commencing process in the other or lead to a more favourable course Van der Burg and Martin advise that in every corneal affection in the tropics accompanied by fever quinine should be given

[1] *Lancet* 1897 September 4 p 621.
[2] *Ind Med. Gaz* 1898 February p 647

Kipp's *keratitis dendritica* and *keratitus profunda* are two additional corneal ailments that are observed in malaria

The former begins in the course of or after an attack of fever with photophobia flow of tears supra orbital neuralgia and a narrow superfic al serp ginous ulcer resembling a skeleton leaf with lateral processes forms on the cornea According to Noges anæsthes a of the cornea and great sensitiveness of the supra orbital nerve on pressure prevails Under specific treatment recovery quickly sets in The same affection is also observed in influenza

Keratitis profunda sometimes comes under observation in malarial cachexia. A greyish infiltration in the middle or deeper layers of the cornea may slowly form. The treatment should consist in quinine atropine and fomentations

Other *eye diseases* may also develop under the influence of malarial infection

Gangrene may set in on various parts of the body, on the cheeks (noma), gums female genitals scrotum, extremities The slightest *ulcerations of the skin* often become *phagedenic* Rigollet also observed *phlebitis* in two cases in consequence of malaria *Wounds* according to

Layrer and Van der Burg heal with difficulty, so that surgical operations in malarial cachexia should be avoided being attended by severe hæmorrhages and gangrene Roux and Martin certainly had contradictory experience Martin however in two cases observed retarded healing of *fractures* the formation of callus sets in late and is apt to be incomplete and it was only after change of climate the definite consolidation of the fracture ensued

Sometimes *multiple abscesses in the subcutaneous tissue* and *boils* develop The former according to Martin are most frequent in the [illegible]

once observed the development of *hepatic abscess* and ulcerative *endocarditis* it is however difficult to see the connection of hepatic abscess and malaria

Neuritis and *multiple neuritis* occur Macnamara observed paralysis of the soft palate and of the left ulnar nerve besides neuro-retinitis Multiple neuritis of a diversified character was observed by Regnault, Strachan and Higbet Glogner even attributes a portion of beri beri symptoms to malaria Nevertheless I consider the four cases communicated by him and in which he observed malarial fever in addition to beri beri symptoms and the aggravation of the former after the latter and *vice versâ* to be complications of beri beri with malaria

[illegible]

According to Young *spinal pachymeningitis* manifested by paresis or paralysis of the lower extremities is often developed after severe and prolonged malaria

Myelitis also symptomatologically and probably also anatomically, of different kinds may according to Remlinger appear during the course of pernicious as well as intermittent fevers Triantaphyllides observed three cases of *multiple sclerosis* in consequence of malaria two of which recovered through specific anti malarial treatment

Sometimes in consequence of malaria *mental disorders* occur According to Frerichs these are set up by a deposit of pigment in the cerebral cortex whereas Pasmanik attributes them to the toxin formed by the malaria parasites and more especially to cachexia According to this author conditions of simple melancholia perturbed melancholia and imbecility occur, all of which exhibit a depressing character The prognosis is almost invariably favourable

Judica observed *attacks of hysterical convulsions* with hemianæsthesia as a consequence of malarial cachexia, and which yielded to anti malarial treatment.

We are indebted to Dehio s careful investigations for our knowledge on the condition of the *body temperature* in malarial cachexia During its course intermittent or irregular attacks of fever appear occasionally, accompanied by slight temperature, these however, rarely set in separately but mostly form persistent connected periods of fever During the afebrile intervals however the temperature is abnormal its course being irregular and atypical and similar to that of the feverish period

The average daily temperatures are sometimes relatively high, sometimes far lower

The *subjective symptoms of fever* are, according to Van der Scheer, often very slight so that temperatures of even 39 40 cause no feeling of illness This is important in regard to the statement of some authors that malarial cachexia may exist without previous fever

Malarial disease may drag on for months or even years It can be borne longer by the natives of malarious countries than by Europeans Transient improvements are effected with suitable treatment, but recovery can only be hoped for if the malarious region be left, yet even this is not certain, and according to Werner traces of the disease remain during the whole life, even in the most favourable cases

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Topi is of opinion that malarial cachexia (like pernicious anæmia) is caused by *gastric lesions* In several cases he discovered numerous malaria parasites in the most varying stages of development in the shrunken and degenerated digestive glands of the stomach and the surrounding capillaries.

It is a remarkable fact that malarial cachexia is observed with very different frequency in the worst malarious regions In India, more particularly in the Terai, Deccan and North Ceylon, it is of very frequent occurrence in Africa, on the other hand, it is very rare Neither F Plehn in Cameroon nor Koch in German East Africa, ever encountered a typical case of malarial cachexia

Buchanan describes a *cachectic form of fever* occurring frequently in *Indian jails* at the end of the "unhealthy season, and which is observed mostly in patients who have previously suffered from intermittent fever and dysentery The disease commences either with low fever, or with high fever lasting a week and succeeded by low fever The patient becomes weaker and thinner and appears anæmic The sclerotic may assume a yellow tint, the tongue is either large and relaxed, exhibiting indentations of the teeth at the edges and black pigmented spots, as are frequently observed in native Indians, or, especially during the further course of the disease, the tongue is red and raw The gums are blackish blue or red, swollen and ulcerated Frequently between the upper and lower last molars, on one side or both, there is an ulcer known in India under the name of "*Crombie's molar ulcer*" The feet and regions of the joints are frequently œdematous, ascites often prevails also, and the spleen is enlarged The patients frequently suffer from nyctalopia When the patients become still weaker mucous diarrhœa or dysentery sets in or gangrene of the large intestine such as is observed in chronic dysentery obtains, and mostly ends in death In other cases the patients become thinner month by month till they finally succumb to inflammation of the lungs or sudden pulmonary œdema Nevertheless

all cases are not hopeless Recovery may set in if the patient be liberally fed.

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Kála-azár, like ordinary malarial fever in Assam, generally sets in during the

months

Death, according to the investigations of Dodds Price occurs in 96 per cent of the cases as a consequence of exhaustion or chronic diarrhœa, or, in the case of patients who have survived the rainy season, through pneumonia and other pulmonary affec-

into red

[1] Giles, G M "The Etiology of Kála-azár" *Ind Med. Gaz*, xxxiii, 1898, No 1, p 1

Powell, Arthur. "Prevalence of certain Intestinal Parasites in India, &c" *Ibid.*, No 12, p 441

Rogers, Leonard "Report on an Investigation of the Epidemic of Malarial Fever in Assam or Kála-azár" Shillong 1897

— "The Epidemic Malarial Fever of Assam" *Ind Med Gaz.*, xxxiii., 1898, No 6, p 210, No 7, p 246

— 'The Epidemic Malarial Fever of Assam, successfully eradicated from tea garden lines' *Brit Med Journ*, 1898 p 28 p 891

— "On the Epidemic Malarial Fever of Assam or Kála azár' *Medico-Chirurgical Transactions*, lxxxi, 1898

Thornhill, Hayman "A Criticism on Dr Rogers' Report on Kála azár" *Ind Med. Gaz*, xxxiii., 1898, No 2, p. 50, No 3, p 86.

sease although all the
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Rogers is of opinion that kála azár is an aggravation of ordinary malaria and that in consequence the disease has become transmissible from person to person, either direct through the air or more frequently by passage through the soil, a view which is irreconcilable with the present state of our knowledge of the ætiology of malaria. Ross, who has likewise studied the disease, asserts that only an indirect transmissibility

district of Assam, on cases of anchylostomiasis, and cases of the latter complicated with malaria He found that in kála azár, as in malarial cachexia the red blood corpuscles and the hæmoglobin were proportionately diminished the white blood

condition are defective

[1] Brown, E Harold "A Report on Kola Dukh," *Ind Med. Gaz*, xxxiii., 1898, No 9, p. 324

[2] "Hématimétrie normale de l'Européen aux pays chauds" *Arch. de méd. nav*, 1888, No 12

[3] "Over tropische Anamie" *Geneesk. Tydsch. v Nederl Ind.*, xxx, 1890, Edit 4 and 5

[4] "Over zoo genaamde tropische anæmia" *Geneesk Tydsch v Nederl Ind*, xxx, 1890, 3rd edition "Blutuntersuchungen in den Tropen" *Virch. Arch*, cxxvi, 1898 113.

[5] "Blutuntersuchungen in den Tropen" *Ibid.*, cxxviii, 1892 p 100

[6] "Beitrag zur Pathologie der Tropen" *Ibid.*, cxxix., 1892, p. 285

The existence of a kind of *climatic atrophy of the kidneys* in persons w

According to Glogner, the *amount of heat lost by means of radiation and conduction* is greater in natives than in Europeans while according to Eijkman there is no important difference

The *gastro intestinal activity* is sluggish and there is *a tendency to constipation* which according to Schellong is sufficiently explained by the quantity of fluid parted with through perspiration and the consequent rapid consolidation of the intestinal contents and by a relaxation of the muscles of the intestines, in harmony with the relaxation of all other muscles

Opinions do not coincide as to the quantity of blood contained in the mucous membranes of the stomach and intestines in relation to the fulness of the vessels of the skin According to one opinion there is a certain hyperæmia according to another

he day no other stool follows (van der Burg Martin)

In regard to the liver most authors are of opinion that Europeans soon after arriving in the tropics from a temperate climate generally develop a more or less

malaria Fertility diminishes and, according to statements unsupported however

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PATHOLOGICAL ANATOMY.

cases the spleen is firm and tense, on section it is found to contain a great deal of pigment, and the capsule is mostly thickened and adherent to the neighbouring organs

In tropical malaria the enlargement of the spleen is not so constant as it is in endemic intermittent fever Even in very serious tropical fevers there may be no enlargement, or to a very minor extent Rochard, in twenty two cases of malarial fever with a fatal termination in Madagascar, found no enlargement at the *post mortem* examinations (F. Plehn)

Splenic infarcts becoming purulent or gangrenous are rare conditions

(2) *Melanæmia* —Pigment in the form of granules or flakes, black, or more rarely brown or yellowish red is found partly free in the blood, partly locked up in leucocytes or vascular endothelia Pigment is likewise found in the spleen, liver, bone marrow, brain, spinal cord, kidneys, heart, lungs, lymphatic glands, skin, serous membranes &c, and impart a characteristic slate grey or chocolate brown colour, which is principally exhibited along the course of the vessels to these organs The pigment,

Its ferruginous contents are not constant Stieda found that it was ferruginous in the liver, and free from iron in the vessels and spleen

As with the enlargement of the spleen, so with the melanæmia In the severest forms of fever causing death in a short time, one frequently finds light, thin blood, entirely without pigment and also extreme pallor of all the internal organs except, of course the spleen, which in the majority of cases is strongly pigmented (F Plehn)

As to the other changes in the blood, exclusive of the malaria parasites mentioned above, the number of *red blood corpuscles* is often diminished

of fever which, nevertheless, disappears again after from six to fifteen minutes so that it may easily escape detection

...ood corpuscles

and may still

The activity

of the phagocytes relates almost exclusively to the single nucleated cells (micro and macrophages) and these are, thereupon, retained in the spleen and liver in their passage through the lymph glands In malarial cachexia the white blood corpuscles, according to Kelsch, are relatively and absolutely diminished Babes and Gheorghiu observed, on the other

hand, that in chronic afebrile malaria there is always severe leucocytosis Grawitz found the eosinophile cells relatively increased, especially in malarial anæmia

In *blackwater fever* punctiform and larger *hæmorrhages* were found in various organs, as in the brain, retina, pericardium, pleura, mucous membranes of the stomach and intestines mesenteries, capsule of the kidney, kidney pelvis and subcutaneous tissue

The *heart* is mostly dilated and the myocardium pale, relaxed and shrunk, but not always showing fatty degeneration Frequently there is an extensive formation of thrombi Occasionally ecchymoses are dis covered in the pericardium and endocardium

The *lungs* are often hyperæmic and œdematous, and occasionally exhibit hæmorrhagic infarcts In one case of malarial pneumonia I was able to confirm brownish red and greyish red hepatisation In milder cases, in which the local phenomena disappear during the intermissions of fever it may not go beyond *engorgement*

The *mucous membrane of the stomach* frequently becomes hyperæmic and in hæmatemesis may be ecchymosed In *blackwater fever* Doring found it in the most advanced condition of inflammation—even hæmor rhagic in places—and covered by a very thick layer of viscid mucus stained green by bile

The *intestine* is likewise frequently the seat of hyperæmia and catarrh, or is ecchymosed The solitary follicles and Peyer s patches occasionally exhibit enlargements and pigmentation In the *choleraic malaria* con *dition, Marchiafava found the parasites principally localised in the small* vessels of the dark red or chocolate coloured mucous membrane of the intestinal tract whereas the other organs contained only a few parasites or none at all In *malaria dysenterica* the large intestine, according to Werner, exhibits round or irregularly formed ulcerations, 1 cm or more in diameter, the base of which is formed by the opaque serous covering and is often covered with detritus The mucous membrane, at the same time, varies in colour from bright red to dirty violet and slate colour, it becomes swollen and relaxed and exhibits occasionally small cicatrices, depressions and contractions Frequently also the ileum exhibits the same condition In *malarial typhoid*, besides deposits of pigment in various organs, the changes characteristic of typhoid are found in the intestinal canal

The *liver* in *acute cases* is frequently enlarged, hyperæmic, dark red and soft or, after the disappearance of the hyperæmia remains of a chocolate or slate colour In *blackwater fever* and in cases in which all the internal organs exhibit more or less icterus, it is very deeply stained and more or less yellow

The hepatic ducts are always patent (Fonceroines), and like the gall bladder are found to be filled with dark, greenish black thick bile

Conolly, in *blackwater fever*, found numerous nodes varying in size from the head of a pin to a pea and which on incision were found to be cysts filled with a thick, fluid caseous mass of a light yellow colour

The agglomeration of pigment in the intra lobular spaces is sometimes so marked that the periphery of the lobes appear to be surrounded by a distinct black zone The intra lobular capillaries are dilated, their endothelium swollen and pigmented, and they contain malaria parasites, frequently in [illegible]
hepatic cells
is present

and confluent inflammatory and suppurative foci, which, however, have probably no connection with malaria

In *chronic cases* the liver is mostly large and firm, in consequence of increase of connective tissue, it is much pigmented, often granular (hypertrophic cirrhosis), more rarely of normal size or shrunken as in *ordinary hepatic cirrhosis*, the capsule is usually thickened Sometimes, also, amyloid degeneration is observed

Occasionally the liver is observed to be atrophic without cirrhosis, appearing anæmic and chocolate coloured, in such cases the heart and

they are hyperæmic or partly sub capsular and on section the pyramids appear dark reddish brown, and the cortical substance lighter Pellarin and F Plehn observed hæmorrhagic infarcts, and the former observed abscesses also in the cortex

Microscopically, in fresh cases, the epithelium of the urinary tubules and Bowman's capsules are found to be normal, in cases of longer duration of the disease there is albuminous infiltration of the same, and the urinary tubules are obstructed with hyaline casts and yellow pigment, the pigment is more especially present in blackwater fever, there is also often an increase of the interstitial connective tissue

In chronic cases, hypertrophy of the interstitial connective tissue, diffuse inflammations, amyloid degeneration and sometimes also cirrhosis, are observed

In regard to the *brain*, when cerebral symptoms have previously existed, hyperæmia and œdema of the cerebral substance and of the cerebral meninges are found along with agglomerations of fluid in the ventricles and occasionally softening of the brain tissue The cerebral vessels are, as a rule, remarkably rich in malaria parasites and some

n the vicinity of the vessels con- *ral cortex is often more or less* oured, the same condition is met

brain appears pale, bloodless, dry Steudel found, besides dryness of , dry and small that it no longer filled the cranial cavity, the sinuses were filled with blood and the cerebral meninges were œdematous

In one case of *malaria perniciosa comatosa* which Jancsó observed in Klausenburg there was no obstruction of the cerebral capillaries through parasites or pigment and he is of opinion that the serious cerebral symptoms are originated by the *toxic products of metabolism* of the parasites.

T

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titie

tissue itself. In *malarial cachexia* the medulla of the long hollow bones is always changed into red medulla (Rogers)

DIAGNOSIS

The diagnosis of malarial disease is especially founded on the proof of *splenic tumours parasites in the blood* and *melanæmia* Parasites and pigment however are not always to be found in the peripheral blood In such cases the blood for examination must be extracted from the spleen by means of a Pravaz syringe with the application of antiseptic precaut ons The presence of one single parasite in the blood confirms the diagnosis (Mannaberg) The ætiolog cal diagnosis is especially necessary when malaria appears in the course of other illnesses or injuries and after parturition

The *intermittent fevers* generally offer no difficulties in diagnosis In the differential diagnosis tuberculosis suppurative processes (hepatic abscess) pyæmia ulcerative endocarditis urethral fevers attacks of fever in consequence of the passage of gall stones and the attacks of fever occurring in filariasis must be taken into account Errors in diagnosis are avoided by carefully taking the temperatures by having regard to the history of the disease and by due attention to the accompanying symptoms

It is easier to mistake remittent and continued fevers for gastric disturbance catarrhal jaundice or typho d but even in these forms the expedients above mentioned should suffice for diagnosis

In the differential diagnosis between malaria and typhoid it should be borne in mind that in malaria herpetic spots are frequently present but except in so called malarial typhoid a rash is never observed

The *comatose form* may be confused with heat apoplexy mening tis uræmia or cerebral hæmorrhage The absence of hyperpyrexia st ffness of the neck oculo motor paralyses and albuminuria on the one hand and the presence of fever (41 42° and more) splenic enlargement and above all of paras tes in the blood on the other should decide in favour of malaria Sometimes in partly unconscious patients the sensitiveness

malaria

imilarity to *Asiatic cholera* but can by the blood examination and the intestinal evacuations which in

ial pneumonia may present greater of fever the presence of a splenic l parasites in the blood confirm the

diagnosis

account of anuria,

a few hours in yellow fever only after two or three days (5) the presence generally of splenic tumour in blackwater fever, and its absence in yellow fever (6) in blackwater fever coffee ground vomit (vomito negro) is of

[illegible]

junctivæ and a hot skin)

Below a stateme t tl at blackwater fever is a form of endemic yellow fever has received a sat sfactory contradiction by F Plehn

The *maske l forms* are recognised by their periodicity their behaviour to quinine, and the presence of parasites in the blood In malarial regions the possibility of masked forms of malaria should never be lost sight of in deal ng with atypical forms of illness

Kohlbrugge in doubtful cases makes use of *mountain climb ng* as a d agnost c assistance He causes the pat ents to cl mb mountains and then be spor ged v th cold water if no fever sets in on the follow ng day they are not suffering from malaria but from other d seases

PROGNOSIS

The prognosis of malaria depends on the age constitution manner of life social position of the patients and on their length of stay in the malarious districts also to a large extent on place season and the form of the disease

Firstly, in regard to *age* the early age of childhood and old age are the most dangerous According to Davidson the highest mortal ty is in infants under 1 year old In the Teutonic race the impossibility of becoming acclimatised in the tropics is due primarily to the great mortality of children in consequence of malaria In the case of strong young persons recently arrived in malarious districts the prognosis even in severe forms is not unfavourable while those persons who are the subjects of a diathesis such as syphilit cs for instance and persons who have already dwelt long in the tropics the disease is always more serious

Any and every excess in the manner of living and general unhyg enic conditions render the prognosis unfavourable

As regards the d fferent forms of malar a the prognosis taken generally, is good in intermittent fevers remittent fevers and masked [illegible] evere remittent and pernicious [illegible] cholera c forms and in black [illegible] to a great extent depends on [illegible] eart and kidneys If after defervescence a copious secretion of urine takes place this is a good sign whereas if anuria [illegible]

[illegible] murmurs and very *frequently irregular* action of the heart Moreover, early marked icterus severe bilious vomiting severe hæmoglobinuria, hiccough and the setting in of cerebral symptoms must be regarded as unfavourable signs

Even in apparently mild cases when the illness is attended by an adynamic state faintings or severe headaches must always awaken suspicions that the disease may take an unfavourable turn

In *chronic malarial infection* the prognosis depends on the degree the

disease has attained Should the symptoms be only moderately developed should the spleen and liver not have attained a great size or become indurated and should the kidneys be still healthy hopes of recovery need not be ban shed

It is difficult in various cases to prognosticate in regard to *relapses* continuing If a splenic tumour remain one must always be prepared for relapses and they may even occur without enlargement of the spleen being present So long as malaria parasites are in the blood relapses may be expected

spect Accord
e of good care

PROPHYLAXIS

been attained in various places on the surface of the globe by *plants shrubs trees &c that have the quality of absorbing water* Such plants are the sun flower (*helianthus ann us*) various species of eucalyptus (more especially *E rostrata* and *E globulus*) water rice (*zizania aquat ca*) the calmus (*acorus calamus aromat cus*) *the anacharis alsinastrum* the *papaya*) the conifer *aulown a imperialis*) been found of most irwa bush (*avicenna*

to seek out and destroy the the dwellings but it is not measure everywhere as for instance where rice is cultivated The larvæ of the genus *anopheles* which are the only larvæ of importance may be easily recognised by the fact that they float like little rods flat on the water In order to destroy the larvæ insect powders petroleum according to the experiments of Celli practical and the cheapest General be carried out more particularly is this the case in new colonies The

Compare Fisch *Tropische Krankheiten* Basel 1894 p 10 Daubler *Die Grundzüge der Tropenhygiene* Munchen 1895 p 63 Scheube article *Tropenhygiene* in *Eulenburg s Encyklop Jahrbb* v 1899 p 584

ing site If possible an elevated spot with a rocky subsoil accessible to the winds and situated at a distance of 1 2 kilometres to the windward of swamps The foundation should be covered to a depth of from ½-1 metre with tightly packed gravel, or better still, should be asphalted or cemented The house should be supported on a sub structure, formed of pillars, arched buttresses, or iron piles, and should be surrounded on all sides, or at least on two sides, by a verandah 2 or 3 metres wide, and the top of which is formed by the wide projecting roof, here one may sit during the day, and can change one s position according to the direction of the wind and the position of the sun The longest frontage of the building should be so placed that the principal winds may blow unchecked upon it, and it should be only one room deep, so that through ventilation is possible Should the house have two stories, the upper one is preferable for dwelling and more especially for sleeping in In order to keep out the mosquitoes, the doors and windows should either be closed at sundown or provided with wire gauze shutters Slates, or pressed and varnished palm leaves, are to be recommended for roofing the house The kitchen and the latrine (which should be on the bucket system) should be a little distance from the house, but connected by a covered way and situated so that the kitchen smoke and

entire compound, adapted to receive the water pouring off the roof and connected by a gutter with the nearest water course, constant care must be taken to keep the trench clean and free of mosquito breeding places The trench also serves to drain the soil below the house As the smell of eucalyptus trees and castor oil plants is said to keep off mosquitoes, it might be well to plant some near the dwelling on the chance of their so doing Care must be taken to ensure plenty of light and air in the house, and cleanliness should reign supreme The dark corners of the house should be scrupulously searched for mosquitoes, which are wont to sleep there during the day

Clothing suitable to the climate also plays a not unimportant part in ... ed for the tropics is ... upper garments, or ... helmet made of cork

... ut that man in the tropics requires less nourishment to maintain his alimentary balance than in a temperate climate, is exploded By means of experiments conducted especially by Eijkman it is proved that in order to maintain in the tropics the same bodily condition and the same power of doing work, as much nourishment (reckoned in calories) is required as at home During the summer heat of the tropics, however there is less desire for meat and

important to tempt the appetite by judicious choice of food and agreeable variety, and to ingest the necessary quantity of nourishment in the most digestible form possible. In places where game cannot be obtained, where no cattle are bred and where indigenous vegetables cannot be

cultivated as they are in high lying regions [illegible]
more or less the customs of the
to a minimum I consider the
Indies by Europeans worthy [illegible], the midday meal (rice meal) consisting of indigenous food and the evening meal of European food Due attention, also, is paid to the necessity for a regular, but not exaggerated, supply of stimulating comestibles, which according to the opinion of experienced tropical doctors no doubt exists, and is to be explained by the fact that the anæmic mucous membrane of the stomach requires stronger stimulants than in a temperate climate (see above, p 154) The curry taken with the Javanese meal of rice is composed of a mixture of various spices, of which Chili pepper (capsicum annuum) is the most important It is certainly not by chance that all natives of tropical countries, without respect to race or creed, make plentiful use of this spice in their food, and assert that they could not exist without it Martin is of opinion that pepper may perhaps correct the tendency to contract malaria The Tamils who according to his experience are most
As for myself, personally,
suited me better nor did
and the usual addenda of
which the Javanese meal of rice consists, and this actually became a necessity to me Schellong, on the other hand, is of opinion that the idea of spices and pepper being necessary in the tropics is one of the many customary prejudices so numerous in tropical life In any case an excessive use of spices in the tropics may have a deleterious effect and may lead to chronic dyspepsia and favour the appearance of sprue (see sprue) Fruits, so plentiful and manifold in the tropics, are also useful when eaten in moderation, for they excite the appetite and the secretion of the gastric juice and assist the flagging digestion A superfluity of fruit is, however, injurious and may cause indigestion, diarrhœa and dysentery, and thus indirectly induce malaria

The provision of good *drinking water* is of great importance Where this is not obtainable, the water to be used should be sterilised by being boiled for an hour, or by the addition of chemicals (chlorinated lime, bromine tincture of iodine[1]) Filters made of animal charcoal, asbestos, unglazed porcelain, &c, have not proved of general value, as they require to be cleaned very frequently to remain effective, and this is practically difficult of accomplishment The drinking of tea or coffee in lieu of water, under certain circumstances, is to be recommended

[illegible] the moderate use of wine and
Excessive indulgence in either

spect be regulated Inactivity
is just as injurious as over exertion Frequent baths or cool shower baths are recommended One should avoid, as far as possible, everything which, as we have seen above (p 120), predisposes the constitution to attacks of fever

Expeditions, as well as necessary earth works, should, when possible, [illegible]

[1] More minute information in Scheube's article "Tropical Hygiene," in Eulenburg's *Encyklop Jahrbb*, viii, 1899, p 584

be used for anointing the body, such as turpentine iodoform menthol nutmeg camphor, garlic tobacco smoke unexpanded chrysanthemum flowers[1] eucalyptus leaves quassia chips pyrethrum or the burning of sulphur, protective measures which have been tried by Celli and Casagrandi and found effective

In conclusion the *prophylactic use of medicaments* have to be mentioned and for this purpose *quinine arsenic* and *iron* are principally recommended

Quinine as the sovereign means of preventing malaria has the most
all doses (0 15
day or 0·5 to
tly adopted by
ommended by
German doctors (A Plehn F Plehn Steudel Koch &c) The German method decidedly merits the preference because larger doses have more chance of destroying the malaria parasites that may have invaded the body Unfortunately quinine possesses the disadvantage that its continued use injures considerably the digestive organs which have otherwise been already changed by climatic influence It is therefore not advis

mann s advice is very rational namely, always to examine the blood of

singing in the ears is slept off

Arsenic which does not directly influence the malaria parasites is recommended prophylactically because it improves nutrition and in consequence increases the power of resistance of the organism Arsenic is used chiefly in the form of Fowler s solution Two drops daily are commenced with the dose is increased daily by one drop up to twenty drops, and then again gradually decreased The treatment, however must not be continued too long Generally according to Martin, four to six weeks suffice for new arrivals Favourable results have been attained

[1] Celli especially recommends a powder consisting of unexpanded chrysanthemum blossoms valerian roots and larvicide, which is sold by the Italian pharmacological Society in Rome under the name of zanzolina. One tablespoonful of this suffices to stupefy the mosquitoes for from five to eight hours in a room of from 30 to 40 cub. m.

In *experimental malaria* Celli found that euquinine and methylene blue had the best prophylactic effect It may therefore be suggested that practical experiments be

The *thorough treatment and cure of* all malarial patients is also important to successful prophylaxis, for every sufferer from malaria forms a danger to those around him

TREATMENT.

It should be an axiom, especially in warm countries, to treat even the mildest cases of malaria carefully and not *en bagatelle*, as is often done, because even from the mildest illnesses the severest forms may develop

Quinine is the principal remedy for malaria, and is used in all its forms The effect of quinine is that it attacks the malaria parasites direct, checks their development and destroys them Binz, in 1867, proved that quinine exercised this effect on subordinate organisms, infusoria and fungi, which are known to be the cause of the processes of fermentation and putrefaction According to Golgi, Ziemann, &c, the young, extra globular parasites are most susceptible to the action of quinine On the other hand, the crescents are quite uninfluenced by the drug

Schellong does not regard quinine as a specific in malaria According to his opinion it operates on the red blood corpuscles by attracting away the oxygen, thus indirectly destroying the malaria parasites by withholding the oxygen from them

The *dose, manner* and *time of administering quinine*, are of great importance

As regards the *dose*, the administration of small occasional doses has now been quite relinquished in favour of single larger doses at longer intervals In mild forms 1 0 gram is the usual dose for adults, in serious forms 1 0 to 2 0 are administered Experience has taught us that it is useless, and even may prove dangerous, to exceed this quantity The enormous doses (8 0 grams or even 10 0 per diem were formerly given) have now been generally given up In children 0 1 gram is ordered for every year of life, in children under 1 year old 0 1 is the dose

manners of administration are —

(1) The *internal method*

Japanese paper, and a few

afterwards It may also be

or it may be taken in solu

stool The daily dose is given according to occasion once or twice within an hour.

particular suppositories are also advised, the dose being the same as by mouth

(3) *Subcutaneous injection* —This method is employed principally when the symptoms are alarming, and for this purpose quinine bihydrochloride (carbamide) and quinine hydrochloro sulphas are most applicable by reason of their solubility without acid, they are both soluble in equal parts of water and are mostly injected in a proportion of 1·2 to 4

Hertz, for subcutaneous injections, recommends amorphous hydrochloride of quinine, a brown, easily soluble powder, 1 in 4 Höbner advises hydrochloride of quinine 2·0, glycerine, distilled water aa 4·0 (without acid), to be warmed before use, as the

mixture congeals when cold Laveran and other French doctors order quinine hydrochlor 3 0, antipyrin 2 0 aq dest 6 0

(Schellong F Plehn, Ziemann) The subcutaneous method of application has therefore been much relinquished lately, and in its place

(4) *Intra muscular* (glutei muscles) *injections* with the same salts are preferred owing to the fact that they cause less local irritation than the subcutaneous method

According to Aibit a the local inflammations are really useful This author observed that in rebellious forms of malaria recovery ensued when *abscesses* had been caused by subcutaneous inject ons and he is of opinion that phagocytosis is encouraged by the increase of white blood corpuscles during the development of the abscesses.

(5) *Cutaneous applications* are recommended by Rasch in the form of *inunctions of alcoholic solutions of quinine* by Feuchtwanger in the form of *inunctions of ointment* (1 in 20) especially on the back the inside of the thigh in the axillary or inguinal regions, this method is particularly

this injection a vein at the

l a constricting bandage is

yringe is then inserted into

the vein, the bandage is loosened before the liquid is injected, which is then done very slowly, and the small wound closed with collodion Naturally antiseptic precautions must be used The solution which, according to Baccelli should be used tepid consists of hydrochloride of

occupy the second place

use of

The *time for using quinine* depends on the type of malaria from which the patient suffers

In the ordinary intermittent fevers it is regarded as a rule not to administer quinine during the attacks, but *during apyrexia* It has been practically proved that quinine is most effective when given four to six hours before the time when the next attack is expected, so that the complete absorption of the drug is coincident with the development of the youngest brood which is most susceptible to the action of quinine As a rule not the first attack, but the subsequent attacks are thus checked With subcutaneous intramuscular and intravenous injections, in which the action of the quinine is more rapid, it is given one or two hours before the expected attack In order to prevent relapses or latent malaria the use of quinine must be continued several days after even the

am in the morning

advises that quinine

age of development

ult ringed parasites

according to Koch s

experience, suffices to clear the blood of the parasites One more attack

attacks are originated not by the young generation but by the old generation in the process of perishing At the conclusion of the "after fever' one more dose of 1 0 is given, and to prevent relapses 1 0 should be given, continued every fifth day for a month or six weeks

In *remittent* and *continued fevers* the effect of quinine is less apparent and more uncertain than in the intermittent form, but nevertheless, it is the most efficacious medicament known In remittent fevers the periods of remission are chosen for the administration of the quinine. In continued fevers the period of pyrexia must not be waited for, but under

malignant tertian fever

In the *pernicious forms* of fever, not including blackwater fever, in

ly, and

pinions
which
which

now been adopted by the more modern French colonial doctors, and principally by a number of German doctors (Kohlstock, F Plehn, A Plehn, &c) and now counts most followers, is supported by the above mentioned relations between blackwater fever and quinine, and therefore entirely discards the use of quinine in this disease According

by other methods, therefore, doubtless almost or mainly with quinine, of these 15, = 43 per cent died Doring had five deaths amongst 40 cases, 12 5 per cent F Plehn treated 12 cases without quinine on the Tanga Coast (German East Africa) and did not lose one. A comparison of these

without quinine, which,
possesses a pronounced
t the malaria parasites
rpuscles, F. Plehn was
It is only permissible

relapses Should albuminuria persist quinine should be entirely discarded on account of the irritation it exercises on the kidneys In the severe *forms of fever of the tropics it is advisable to* assist the effect of quinine by administering *aperients* more especially *calomel* (0 3 to 0 6) before or with it Buchanan (India) who has had vast experience says Without the preliminary purge I have seldom seen quinine do any good

1

qu n ne

The following *s bst tutes for qu n ne* are used —

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Brit Med Journ 1898 February 26

Next to quinine the most important remedy for malaria is *arsenic*

favourite preparation is Fowler's solution, of which from 2 to 10 drops are administered three times a day the dose being increased daily by one drop. Arsenic has the best effect when given in conjunction with quinine

The *symptomatic* treatment of malarial disorders is not so important as the *specific* treatment, but it is also not without importance The nursing is of great consequence Sometimes malaria is cured in hospital under the influence of better nourishment and rest in bed even without quinine (Nocht)

In *simple intermittent* fever no special treatment is necessary. The patients must keep their bed during the attacks, during the apyrexia they may get up, but not unless there is absolute apyrexia. They should be given invalid diet, consisting of digestible strengthening foods, mostly in liquid form

In *severe rigors* the bed should be warmed, the patients should have a moderate quantity of warm drinks given them, and their skin should be rubbed with hot flannels. Should the rigor persist, F Plehn recom

calomel (0 3—0·6),

pium and ergotin, subcutaneously if necessary.

¹ Med. News, 1898, October 22.

In *headaches, lassitude, and pains in the limbs* antipyrin (0 5) gives good results and if necessary, may be repeatedly given Beck recommends methylene blue (0 3) for headaches

y bromide of potassium (1 0—1 5), cold packs

een exposed to injurious influences, which experience teaches us may cause relapses, to take a hot bath "By the dilatation of the cutaneous vessels the internal organs are considerably relieved, particularly those that play so large a part in *malaria*, namely the liver and spleen, while cold baths drive the blood to the internal organs, and are apt to cause relapses of fever" Every person who has experienced the benefits of the hot bath is able to agree with Rower s advice

In *remittent and continued fevers* cold baths and antifebrile drugs such as *antipyrin (1 0—2 0) antifebrine (0 3—0 5), phenacetin, &c*, are indicated when quinine fails to reduce the temperature In regard to antipyrin, which is freely used in the tropics on account of the rapid amelioration it affords, it must be particularly noted that it is only a symptomatic remedy, and does not affect the disease itself.

Atkinson in very high fever, with unconsciousness, recommends ice-packs The patients are laid on a mackintosh covered with a sheet d pped in ice water, the entire body is packed in ice, and an ice bag applied at the same time to the head

In the therapeutics of the *pernicious forms*, besides quinine strong stimulants, such as champagne, cognac, strong wine, black coffee, ether and camphor, play a large part

In the *algide form* hot baths and packs are indicated in addition, and in excessive diaphoresis, atropine (0 005—0 001 subcutaneously), or of agaricin, may be tried

baths stimu opium, morphia, chloral hydrate, bromides), may be tried, and local eeding (15 to 20 leeches over the mastoid processes) when the face is flushed

plentiful

(15 0 is hot baths or packs

Malaria dysenterica is sometimes favourably influenced at the beginning of the illness by calomel Subnitrate of bismuth and naphthalin are also occasionally efficacious Later on opiates must be given A milk diet is necessary

In *pneumonic and pleuritic malaria* expectorants with narcotics are necessary

In *blackwater fever* one must endeavour to excite diuresis by a plentiful supply of liquids (especially mineral waters and milk), large enemata serve the same purpose Restlessness and insomnia are treated by

ing
Kohlstock

If anuria sets in, F Plehn advises that the intestinal action should b stimulated by calomel and saline aperients. Döring, indeed, in all sever cases, advocates Carlsbad salts (one tablespoonful to a wineglassful o water) French doctors (Quennec and others) have lately prescribed chloroform (4·0—6 0 in 250 0 of mucilage mixture a sip every ten minutes till improvement sets in) The value of this remedy is supposed to rest on its ability to dilate the vessels and thus relieve the congested portal venous system According to the latest reports, however chloroform has not fulfilled expectations Steudel as a last resource advises trans fusion of blood and believes that he saved the life of one patient by this means. Iron and arsenic are administered for the anæmia that is left In nephritis, rest in bed and a milk diet are indicated

Of the *masked forms* of malaria only a few require symptomatic as well as specific treatment

In *inflammation of the lymphatic glands*, according to Martin, quinine, arsenic and iron are recommended Priessnitz's applications with inci sion and enucleation are undertaken when suppuration occurs Inflam mation of the testicle and epididymis is treated by elevation of the part ice, or other local applications

In *post malarial* [illegible] besides quinine (0 5 every five days) arsenic and iron are administered Iron is given according to circumstances in the form of Blaud's pills, or liquor ferri albuminatus (Drees The arsenical iron waters of Levico and Roncegno also may be taken with advantage

Cold douches are mostly recommended for the splenic tumours Hertz combines baths of from fifteen to twenty minutes duration at a tempera ture of 27 to 30, or with cold jet baths—the latter lasting one minute or one and a half minutes Priessnitz's applications (at night), the induction current (daily for five to six minutes) massage subcutaneous injections of iodine with iodide of potassium may be tried Parona recommends iodine 0 25 iodide of potassium [illegible] guaiacol aa 2 5, sterilised glycerine 25 0 daily 1 0 Intramuscular injections of carbolic acid, arsenic ergotin strychnine and especially quinine, every two or three days, are brought into requisition

The *extirpation of the spleen* has been recommended [illegible] by Majewski and [illegible] four [illegible] [illegible] patients [illegible] upon [illegible] the [illegible] of the [illegible] glands take marrow is presumed to [illegible] The bone Bragagi [illegible] regards [illegible] [illegible] hepat and renal affections and extensive adhesion [illegible] of the spleen

Hepatic affections require treatment by natural or artificial Carlsbad waters

Change of climate is one of the most important and in many cases even the only means of treatment for malarial diseases of warm countries In the obstinate milder forms (intermittent masked initial cachexia) change of residence, if only a few miles distant may suffice without regard to the salubrity of the selected place, to cause the illness to disappear Of still more favourable influence is a change to a hill ation, or to a spot known to be healthy It is therefore urgently cessary that sanatoria should be erected on healthy places where nvalescents from malaria and other complaints may be taken in and ed for It is advisable to build such sanatoria at a height of from) to 1,000 m A steep dry and malaria free locality should be chosen high a locality is not advisable as experience has taught that the hill ions of India, situated at an altitude of from 2,000 to 3 000 m are suited to patients with heart and lung diseases or who are suffering rheumatism and dysentery

parasites by being transported to a sanatorium in a malaria free district

Journeys to a more northern subtropical region (Japan is the much favoured place of the tropics of Asia) is of just as much service as residence in a sanatorium, *voyages in the Southern waters* are also of great benefit But the *return to Europe* has the most beneficial effect, and is indicated in every case of advanced malarial cachexia, in intestinal diseases, in diseases of the lungs and lymphatic glands (Martin) and after recovery from pernicious forms of disease, more especially black water fever *If nephritis remains after hæmoglobinuria or if there is a* pronounced idiosyncrasy to quinine, it is necessary to send the patients home (F Plehn) In other cases the patients must stay at least a month in a mountain sanatorium or must take a sea voyage Naturally, during the acute stage the patients cannot travel, but if possible they should be

(probably the consequence of renal lesions) is a further indication for change of climate

Summer is the most advantageous time for the return to Europe and should be spent by the patients in the mountains the Hartz Mountains the Black Forest Riesengebirge, Fichtelberg the Lake of Lucerne &c, are the best places of resort for the patients and the use of chalybeate baths such as Liebenstein, Steben, Alexanderbad Schwalbach, &c, may be suitably combined with the stay A course of treatment in *Carlsbad* Marienbad Neuenahr, Kissingen, Wiesbaden or Schulz Tarasp are recommended for hepatic and splenic disorders Fayrer, who has had ... has lived many years in India to ... he intends returning to the tropics ... never, must be allowed to elapse ... temperate climate before taking ... of fever set in a change of place is advisable

Some patients stop in the south of *Italy*, or on the *Canary Islands* during the first winter as a colder winter climate cannot be borne by persons who have passed many years in the tropics This is especially the case in regard to old people, for whom change of climate is a serious matter Deaths from severe malarial relapses or pneumonia are not at all rare immediately after old tropical residents reach home

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VIII

BERI-BERI

DEFINITION

By the term *beri beri* is understood a disease which appears endemically and epidemically especially in the tropical and subtropical regions of Asia Africa America and Australia. Its principal symptoms consist of disturbance of motion and sensation, dropsy and an affection of the heart. The symptoms are attributable to degenerative changes of an inflammatory nature in many of the peripheral nerves. The main features of the disease consist of perversity of motor and sensory functions.

NAMES

The word *beri beri* is variously [illegible] ... *Pantjak* [illegible] ... coast of New ... case of the ... In ... the ... and ... oedema in Brazil ... *Synclonus beriberia* Mason Good ... *Myelopathia* ... (van Leent) ... *Polyneuritis* ... *Panneuritis endemica* (Baelz).

HISTORY

The [illegible] ... description of the disease. It was ... known to the Romans; two passages of Strabo and Dio Cassius relating to the campaign of the Roman army under Aelius Gallus in Arabia, 24 B.C., when describing the illnesses which attacked the soldiers on the Red Sea littoral, refer to an ailment closely resembling beri beri.

GEOGRAPHICAL DISTRIBUTION

(SEE MAP II)

A study of the geographical distribution of beri beri shows that the disease extends over a large part of the tropical and subtropical countries in the eastern as well as in the western hemisphere, beri beri has also been met with in the temperate zone

In Asia the Malayan Archipelago forms one of the principal centres of beri beri In these islands the disease is endemic, but it periodically appears epidemically, as in Sumatra, where, in Atjeh, the Dutch troops suffer severely from it Beri beri is also endemic in the plantations of the East Coast of Sumatra and in the Lampong districts, in the islands of Bintang, of Banca (particularly in the mining districts), and of Billiton in Borneo beri beri prevails on the coast at Sambas Sampit and Bandjermassing, and in the interior at the mining districts of Sintang and on the island of Labuan In Java, where beri beri has prevailed to any marked extent for only a few decades, the disease is particularly severe at Batavia and on the island of Onrust, and in the district of Banjuwangi in the Celebes especially in the district of Macassar, in the Moluccas, more particularly in Amboina, Saparna, Banda, on the south coast of Ceram and in New Guinea

Beri beri is likewise endemic on the Solo Isles, situated between Borneo and the Philippines, and also in Mindanao In Manila beri beri was unknown until 1882 or 1883, when a severe epidemic occurred and where it now prevails endemically (Maseras)

In India the principal seat of the disease is in the northern provinces, especially on that strip of land between Masulipatam and Ganjam where it occurs endemically, more especially on the coast and in the plain between it and the mountains Beri beri exists, but is far more rare, on the Coromandel Coast, in the lowlands of the Carnatic and on the Malabar Coast It has also been observed in Calcutta and in various parts of the Province of Dakka and in Assam, in the central provinces

In Ceylon beri beri formerly raged with such severity that it was styled ' the bad sickness of Ceylon It has been less prevalent in Ceylon of late years

As to Further India, the disease is frequent in Burmah and Siam, it also occurs in Penang Singapore on the islands situated off the coast of Cochin china, particularly Pulo Condor, and in Saigon, Choquan and Hué (Annam)

In China according to Manson, beri beri has been observed in Shanghai, Soochow, Wenchow, Foochow, Formosa, Amoy, Swatow, Fatshan, and Hongkong, where in 1888 1889 an extensive epidemic raged According to Lynch,[1] cases of beri beri also occur every summer in Chinkiang

In Corea the disease occurs principally in the south

Japan is one of the chief centres of beri beri The disease has an extensive endemic area on the main island, Hondo, where the large cities and the towns situated near the sea coast form its principal seat During the last few decades there has been however, a remarkable spread of the disease, which is now met with even endemically in the central provinces, Kodzuke and Oshiu, and in the mountainous province of

[1] China *Med Rep*, 1894

Shinano In the northern island of Yezo which on the whole, enjoys a temperate climate and has a winter of six to seven months duration, beri beri is frequently met with whereas it appears more rarely on the southern island of Kiushiu The disease also exists in epidemic form amongst the fishermen on the Kurile Islands where the climate is so cold that the grain does not ripen (Grimm)

From the African Continent where beri beri most probably is distributed to a much greater extent than has hitherto been supposed, reports as to the occurrence of the disease have only lately been furnished from the following places Senegal (Lasnet) Gorée (Firket), Sierra Leone (F Plehn) Togo (Doring) Niger (Castellote) Soudan (Suard), Cameroon (Zahl F Plehn Lichtenberg) Gaboon (Calmette Duchâteau) Loango (Firket) Congo (Sims Mense Dryepondt) Angola (Dipper) in West Africa from the Tanga Coast (F Plehn) and in East Africa from Zanzibar (Manson) and even in Natal at Pietermaritzburg The disease has been met with on several adjacent islands Madagascar, Nossi Bé Réunion and Mauritius

In Australia the disease has lately been observed in several places mostly amongst the Chinese (in Sydney Melbourne Wyndham Kimberley) also in New Zealand quite lately there are reports as to its occurrence in New Caledonia (Grall Porée and Vincent) on the Fiji Islands (Bolton) and on the Sandwich Islands (Vineberg)

In America Brazil forms the principal seat of beri beri where during recent decades it has spread not only along the entire coast line, but it has also penetrated into the interior more particularly in the provinces of Pará Minas Geraes and Matto Grosso The disease has also been observed in Paraguay Cayenne[1] Venezuela amongst the labourers on the Isthmus of Panama on the Antilles particularly on Guadeloupe and Cuba Finally it must be mentioned that according to Hirsch a few cases have also been observed in San Francisco California

Lately beri beri has also been observed *in Europe* I cannot concede, however that the epidemic of scurvy described by Delarbre as occurring during the siege of Paris amongst the military garrison and which in a few cases exhibited beri beri like symptoms was actually beri beri On the other hand the epidemic which occurred in the overcrowded Richmond District Asylum in Dublin in 1894 1898 as described by Norman was undoubtedly beri beri notwithstanding the fact that its

Such a coincidence is not surprising when one takes into consideration that some time may have elapsed between the period of the introduction of the disease and the outbreak of the epidemic which was unobserved at its commencement It is to be noted also that it is often difficult or quite impossible to extract from mental patients the history of their disease

[1] According to a recent publication of Fowler the disease also appears to be endemic in British Guiana.

In 1895 no fresh cases came under observation but in July 1896 during which year the mean number of inmates was 1 686 the disease broke out anew, increasing up to September and continuing into the following year A total of 114 persons were attacked namely, 31 men, 83 women (amongst them 7 female attendants) 2 men and 6 women died (no female attendants) = 7 per cent The ep demic was milder than that of 1894, acute cardiac insufficiency and general dropsy were rare and the motor d sturbances less pronounced

In 1897 the mean number of inmates being 1 800 the disease assumed larger

succumbing none of the s ck attendants died

In 1898 with the exception of a number of cases of relapse only 13 fresh cases of the milder form amongst the female inmates came under observation

Almost s multaneously with those in Richmond Asylum Dublin beri beri l ke

disorders

The isolated cases of multiple neuritis observed by Orthmann (Grafenberg

nen of war and cargo boats in the Indian Ocean, it is also Indian coolies backwards and forwards to and from India or the West Coast of Africa to the French Colonies in America (Antilles, Cayenne) There are, besides reports of the occurrence of beri beri amongst crews in the Torres Straits in the Persian Gulf the Red Sea on board Japanese men of war off the Japanese coast, and in the Pacific Ocean, on Brazilian men of war during the war with Paraguay in the Atlantic Ocean The disease

[1] *Une épidémie de paralysie ascendante chez les aliénés rappelant le béri-béri.*

usually broke out amongst the crews after a voyage of from three to four months

Sékoulis reports that beri beri broke out on board a guard ship that was built at Genoa, seven months after leaving Bombay, the disease exhibited itself amongst the Indian crew in the Red Sea, though there were no other cases in that locality at the time

ÆTIOLOGY.

hypothesis, the disease is attributed to a scanty and faulty diet, lacking albumen and fat The correctness of the statement that beri beri is an

tion, but even in beri beri countries it does not occur everywhere, being mostly confined to certain narrow, sharply limited districts As we

ls, barracks, and hospitals, and to certain spaces and storeys of these buildings

(3) The seasons of the year, or rather the *conditions of the weather* occasioned by the seasons, exhibit a certain influence on the appearance of the disease, the maximum of the frequency of the disease occurs during that season which is first of all distinguished by *great* moisture, and secondly by a high *temperature liable to many variations* (Hirsch)

In damp years, beri beri is particularly frequent and severe, and floods, according to the observations made in Atjeh, are followed by a considerable increase of the disease

(4) *During* recent decades, beri beri has attained a considerable distribution in tropical countries, as in Java, Japan and Brazil, without any change of food having taken place amongst the people, so that this reason cannot be made answerable for its appearance In Atjeh, where the disease now rages severely, it was unknown before it was annexed to Holland

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nen and 8 women

y 13 fresh cases of

lin beri beri l ke

disorders

The isolated cases of multiple neuritis observed by Orthmann (Grafenberg

to my views the two diseases are related but by no means identical, they may stand to each other as does cholera nostras to cholera asiatica

observed next in frequency on English men of war and cargo boats in the Bay of Bengal and in other parts of the Indian Ocean, it is also met with on French steamers that carry Indian coolies backwards and forwards to and from India or the West Coast of Africa to the French Colonies in America (Antilles, Cayenne) There are, besides, reports of the occurrence of beri beri amongst crews in the Torres Straits, in the Persian Gulf, the Red Sea, on board Japanese men of war off the Japanese coast, and in the Pacific Ocean, on Brazilian men of war during the war with Paraguay in the Atlantic Ocean The disease

[1] *Une épidémie de paralysie ascendante chez les aliénés rappelant le béri-béri. Ann de l Inst Past*, xii, 1898 9 p 574

[2] Rapport of thirteen cases of multiple neuritis occurring among insane patients *New York Med News*, October 3 1896 p 365, *New York Med Journ* November 20 27, 1897, Ref January 2, 1895, 5, p 492

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ÆTIOLOGY.

Beri beri is an infectious disease and not a mere disturbance of nutrition as it is erroneously considered to be by those who start from the standpoint that food consisting chiefly of rice and dried fish such as is the national food in the beri beri countries of East Asia is insufficient On this [illegible]

tion, but even in beri beri countries it does not occur everywhere being mostly confined to certain narrow, sharply limited districts As we observed above the disease rages principally in tropical and sub tropical districts Within this region of distribution it occurs by predilection on the sea coast, along the banks of large rivers and on the contiguous plains It is less frequent in the interior, and still less so in mountainous

principally attacked Occasionally certain centres and certain buildings are specially attacked, particularly jails barracks, and hospitals, and sometimes the disease is even confined to certain spaces and storeys of these buildings

(3) The seasons of the year, or rather the *conditions of the weather* occasioned by the seasons, exhibit a certain influence on the appearance of the disease, the maximum of the frequency of the disease occurs during that season which is first of all distinguished by *great* moisture, and secondly by a high *temperature liable to many variations* (Hirsch)

most cases occur in July

In damp years, beri beri is particularly frequent and severe and floods, according to the observations made in Atjeh are followed by a considerable increase of the disease

(4) During recent decades, beri beri has attained a considerable distribution in tropical countries, as in Java Japan and Brazil, without any change of food having taken place amongst the people so that this reason cannot be made answerable for its appearance In Atjeh, where the disease now rages severely, it was unknown before it was annexed to Holland

According to observations made lately by Kohlbrugge in the Dutch-Indian army, beri-beri resembles other infectious diseases, inasmuch as it exhibits *periodical fluctuations* Amongst the Europeans, the number of beri-beri illnesses in the years from 1873 1874, were fairly low, then suddenly rose, and from 1888 again sank, but until 1895 it nevertheless remained far higher than it was previous to 1884, it subsequently decreased somewhat in 1896, and in 1897 fell considerably. Amongst Asiatics, the number of cases increased earlier and diminished later Thus it was only when the unknown factors, which caused the increase of the disease, had reached their maximum, that the Europeans were attacked The decrease of the disease preceded all the measures planned to effect that end

By all these facts it is strikingly proved that the actual and essential cause of disease cannot be sought in defective or scanty nutrition Famine has existed in all possible forms, at all times, and on every portion of the surface of the globe, without ever having caused the development of beri beri as a sequence (Hirsch). At the same time it is not disputed that under certain circumstances want of food, like any other weakening factor, may act as a *predisposing cause* in the outbreak of the disease

... of the *Arch ne der Bureaux der Marine*

ment of treatment by rice with the husks retain ed appears to ha e now been relinquished in the Dutch Indies

The analogy with malaria is in some respects striking and therefore

[1] Arch. fur Schiffs u Tropen hyg ... 1898 pp 33 & 40

beri beri was formerly often regarded as being a peculiar form of malaria This erroneous view is contradicted, however, by several important facts above all by the utterly different clinical and pathological features afforded by the two diseases and their different geographical distribution On the one hand there are deadly malarial regions that are free from beri beri such as the province of Orissa the Delta of the Ganges (India) and the notorious district Tjilatjap on the south coast of Java on the other hand beri beri is endemic in many districts in which malaria is rare such as Singapore and the mountainous parts of several districts of the Malay peninsula Moreover it must be borne in mind that beri beri occurs in towns malaria in the country also that quinine has no effect whatever on beri beri

I consider that there is no question of contagion in beri beri In cases where several illnesses occur in one house simultaneously or close one after the other or where persons nursing beri beri patients are attacked

place in different countries—in Java Sumatra Japan Brazil—with the the A l in

the literature on this subject

Beri beri hitherto unknown in the Penang jail according to Grey broke out soon after the importation *of two hundred prisoners from* Singapore where the disease is endemic

Vorderman communicates similar observations from the jails of the Dutch Indies

when exposed to climatic influences favourable to its growth in the vicinity of the Salomon Islands

The *nature of the virus of the disease* is still unknown, at least my personal opinion is that the micro organisms hitherto found in the blood and tissues of beri-beri patients by various observers, are not the specific excitants.

Quite a number of *bacteriological examinations* have been published, but the results

[illegible]

the patients had eaten

Lately Glogner, in a great number of cases of beri beri which mostly ran their course with splenic enlargement and mild fever, found (but not constantly) *forms similar to* malaria parasites in the blood of the spleen the forms are mobile and

[illegible]

malaria.

[illegible]

disease, or the animals used for the experiments are immune from beri beri

[1] My monograph on beri beri contains a detailed criticism on Pekelharing and Winkler's experiments, p 188.

[2] *Remarks in the proof* —The illustration of the excitants of beri beri appearing in Glogner's latest work (*Virch Arch*, clviii 1899, No 3, p 444), which are not stainable impress me as being pigment

Van der Scheer has recently drawn attention to the question that, as beri beri is particularly a disease of dwellings perhaps certain creatures living in houses such as cockroaches, may play a part in its transmission

bolism (ptomaine) on the nerve tissues We know for a certainty that great moisture and a high temperature are necessary to its development and that it has a certain connection with the *soil* The soil independent of its geological character—for the disease occurs on alluvial, volcanic, and rocky soil—is probably its original place of development Disturbance of the soil favours the development of beri beri as well as of malaria According to the observations made in the tobacco plantations on the east coast of Sumatra, the disease occurs more frequently amongst the

warmth besides a suitable nutritive soil it may establish itself, multiply, and thus form fresh breeding places Persons dwelling in buildings with damp foundations are particularly liable to be attacked The transmission of the determining factor of the disease can of course take place by means of human beings, as well as by means of inanimate objects, such as clothes, &c

eans of drinking water He
or five weeks after shipping
opean drinking water was on
stay of the ships at beri beri

Race and *nationality* play an important part in the ætiology of beri beri In all those countries visited epidemically, or are endemically

absolute, is nevertheless very marked, and is more pronounced in some countries than in others.

when abroad

Besides the difference in race, the favourable *hygienic conditions* under which Europeans and Americans live in all these countries, have a great deal to do with their exemption from beri beri From this circumstance it appears to me, that the reason Europeans were formerly more liable to be seized with beri beri than at the present time, is to be sought in the fact that formerly the hygienic conditions were not so good as now At the present time soldiers, who are compelled to live in the same manner as the natives, are especially liable to beri beri, while a case amongst the civilians is a great rarity

According to reports from all beri beri lands, the *male sex* exhibits a far greater predisposition to the disease than the female sex The rela-

boarding schools and convents

As to the *age*, beri beri is mostly a disease of the *prime of life* According to my observations, the ages from 16 to 25 years are most liable to the disease The age of childhood, with few exceptions, is spared, and the disease is but seldom exhibited in extreme old age My youngest patient was 8 years of age, my oldest 65

Dr Graham of Deli, Sumatra, sent me the photograph of a Chinese boy, not 5 years

[illegible] After all said and done I am not convinced of the existence of infant beri beri

band amongst civilians it occurs in persons whose occupations necessitate a sitting posture By far the largest contingent of my patients consisted of teachers students priests clerks merchants shopmen artists and artisans Similar observations have been made in Brazil The reports from Dutch and British India principally relate to soldiers sailors and prisoners but this is attributable to other conditions Fiebig lately has pointed out that beri beri occurs far more frequently than hitherto supposed amongst the native population and in the coloured people who are not exposed to compulsory labour nor to a sedentary manner of life and that principally fishermen hunters sago gatherers gardeners and pearl fishers are attacked none of whom pursue their calling in a

suppose that *continued dwelling in a more or less crowded badly ventilated apartment* ... in conjunction with other ... ing to the opinion of many ... beri beri The justice of ... uency of the appearance of the disease in *barracks prisons asylums factories and ships* On board ships beri beri has been observed to break out principally when in consequence of stormy weather the holds &c have had to be kept closed According to Pekelharing and Winkler the micro organism always finds nourishment where it can reside and multiply in buildings &c in which many persons live together

level with the soil and Elsberger by working on marshy ground My patients most frequently asserted that long marches were the incidental

... phoid fever cholera dysentery malaria ... arrhal diseases pleurisy and also in ... ngeal phthisis and after operations ... evere menorrhagia leading to anæmia

The same influences that serve as incidental or exciting causes may also cause the aggravation of symptoms when the disease is present Nevertheless it is sometimes observed that when during the course of beri beri other diseases occur intercurrently, which is often the case there is an improvement in the beri beri

Finally, *acclimatisation* is of importance In places where beri beri is endemic the natives are attacked by the disease far more rarely than those who have immigrated from elsewhere, immigrants, however, only become affected after a long stay in a beri-beri district, and this holds good not only for foreigners but for persons belonging to the same country and nation According to my observations, the circumstance of beri beri being endemic in the home the immigrants have left has no influence The time that elapses between the period of immigration and the period of acclimatisation varies according to my experience it fluctuates between weeks, months, and years, a period of over six months, however, is the rule, and in this connection much depends on the season during which the immigration into the beri beri district has taken place.

The predisposition is not extinguished by recovery from the disease, on the other hand, he who has once had beri beri is apt to be attacked again The *relapses* are sometimes milder, sometimes more severe than the initial attack, and are repeated every year for shorter or longer periods, sometimes ten, twenty, or even thirty years, the attacks meanwhile becoming milder and milder until finally the victims may be regarded as immune Sometimes the disease remains absent for one or several years, and then appears anew Occasionally two, or even three, attacks occur during the course of one year

According to an old statement of Schneider which however, requires renewed confirmation beri beri very often occurs amongst animals fowls, sheep oxen, horses, dogs and pigs being liable to it De Lacerda declares that the horse disease "quabra banda" (plague of horses) prevailing in Marajó Island (Brazil) is identical with beri beri

SYMPTOMATOLOGY.

Beri beri may exhibit several different clinical aspects At one time the symptoms caused by the disease are so trivial, and the condition of the patient so little disturbed, that one is hardly inclined to consider him ill In other cases the patients exhibit the most serious disturbances, and the disease may tend to a fatal
but few other diseases In bot
is present, in both the same
the degree of their developmer

already done in my previous publications

indisposition or by rigors, disinclination for work, low spirits, headaches or heaviness of the head I, myself, have but rarely observed such a prodromal stage

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ceptional cases it invades the face, tongue, pharynx and larynx In severest cases the patients lie, a picture of misery, almost motionless, entirely dependent on the help of those around them. In addition limbs are at times so sensitive that the patient screams with pain lightest touch, and cannot even bear the pressure of the bed Sometimes they are also tortured by spontaneous pains, the limbs become excessively emaciated, the calves disappearing Sensation is disturbed to a greater degree than in the rudi m, both as regards the extent and also the grade of diminution , yet complete anæsthesia does not occur even in this form hand, cardiac symptoms and œdema are either entirely play a small part in the clinical features of the disease

ry ensues very slowly, months generally elapse before the nt gradually learns to use his limbs again, and a year or more passes they regain their former strength and contour

n other cases, particularly those that are complicated with other ases, such as typhoid, dysentery, pulmonary phthisis, &c, the illness es an unfavourable turn The weakness and exhaustion of the patients ease more and more, and towards the end of life œdema sets in, tional complications, such as pleurisy, endocarditis may ensue, con sness is lost and death occurs quietly

3) The dropsical or moist, or hydro atrophic, form

is form is distinguished from the preceding by the appearance of *ac symptoms* and serous *exudations* In isolated cases this variety lops from the atrophic form As a rule the commencement is similar at of the rudimentary form The weakness of the limbs increases times quickly, sometimes more slowly, the patients can no longer k Generally, however, the paralysis is not to such a degree as is ase in the atrophic form Moreover, the œdema does not remain ed to the legs but gradually spreads over a more or less large por the body In addition there are effusions into the serous cavities, ion of the heart, shortness of breath, oppression and pressure pit of the stomach attain a considerable hold, the secretion of diminished The disease may remain in this stage for weeks, nptoms alternately increasing and diminishing The absorption of

, the

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other symptoms abate The reverse also sometimes occurs. The return of power to move comes slowly as in the atrophic form As, however, the paralyses as a rule are not so considerable as in the atrophic form—sometimes being quite minor—recovery does not take so long, though from the time the patient was taken ill until recovery, nine months or more may elapse

In 1877 1880 a d ...

[1] K Macleod, *Transactions of the Epidemic Society of London* N S, vol xii, p 55, "Allbutt's System of Medicine," vol ii, 1897, p 475, A Davidson, *Edinb M J Journ*, August, 1881

(4) The acute, pernicious, or cardiac form

This form, which by predilection attacks persons in the prime of life, is characterised by symptoms of *acute cardiac insufficiency*, which may appear suddenly during the course of cases which previously appeared quite mild More frequently, however, the entire course of the disease is acute from the commencement Fatigue and heaviness in the legs, tension in the calves, diminution of sensation, slight œdema, palpitation of the heart and oppression occur in rapid succession and soon increase After only a few days the paralysis of the legs may be so advanced that the patients are bedridden In some cases, on the other hand, the paralysis does not attain so great a degree during the entire illness, and even very acute cases may run their course without either motor or sensory disturbances (Fiebig, A Plehn) Early in the disease the cardiac symptoms become prominent Palpitation of the heart, oppression and shortness of breath are the most troublesome symptoms The appetite is usually lost soon after the commencement of the illness, and on the other hand the patients are tormented by unceasing thirst The diminution of the urinary secretion is considerable, even at an early date The œdema may be of only small degree or may even be absent. Accumulations of fluid are generally extant in the pericardium and other serous cavities, but as a rule the effusions are not so copious as in the dropsical form. Palpitation of the heart and dyspnœa steadily increase, the oppression sometimes rises to terrible precordial agony, the patient feeling as if his

... secretion decreases still
The patient's condition
... hrows himself restlessly
... are wide open, the gaze
... otids palpitate, the chest
... tending over the cardiac

four hours According to my experience, these very acute cases do not occur in Japan; though it may be taken for granted that in such cases symptoms were present for a shorter or longer period, but had been

neglected on account of their trivial ty In the cases ob erved by me a week or two or a month elapsed bet veer the commencement of the attack and its fatal tern nat on

St ll anotl er form the *po ysa oi* or *ad pose* has been de cribed b Oudenho en

Ist r on

(1) *Beri-beri s m) lex* a s n ple attack of ber ber ndu ed by on ntroduct o s of the v us a d
( ) *I ri beri u p ca u a ci m at* wh h ensue n co sequence of fresl nfect on of the v us aga and aga n th s a d v s on b h n t wo tl y of

The relat ve frequency of tl e d fferent forms of the d sease d ffers in the var ous beri beri countries In some places tl e ser ous forms are more frequent than i others Thus in the Malay pen nsula the d sease s dec dedly of a more mal gnant character than n Japan There is also

Analysis of the Separate Symptoms

(1) *Nervo s syste i —A d sturbi c of mo e e t* is the most str king and constant symptom of beri beri Th s beg ns in the legs and continues in the arms and other parts of the body but s always most pronounced in the legs The degree of th s d sturbance is remarkably var ed all trans t ons occurring from the m ldest pares s or ly observable by the pat ent h mself to complete paralysis

In the m ldest cases the pat ents compla n of languor and weakness and heaviness of the legs Walking s an effort they soon beco e fat gued the knee jo nt or even the whole of the legs and feet feel loose

are expressed as a rule The exan nat on w tl the dynamometer however mostly proves that in the arms also the gross strength s dim n shed tl ough it may be to a lesser degree

When the paralysis has progressed still further, attention is directed to the patients by their unique gait, which has been appropriately compared (van Overbeek de Meijer) to the walk of a person emerging from the water wit
(Elsberger)
raises the fo
with a stamp

also occasionally becomes
sandals which are kept
frequently lose them in
walking in consequence of the disturbance of action in the toes nor can

recumbent position they are still able to make a few movements As a rule the extensors of both arms and legs are paralysed to a greater degree than the flexc
above downwards
hands and fingers re
varus position

In the highest degree of paralysis the motor power of the limbs is almost completely suspended, such patients lying quite helpless and unable to move even a finger or toe

Sometimes the paralysis is more pronounced on one half of the body

muscles
more or

or upper
tance ,
such as coughing, sneezing, &c are rendered more difficult, and evacuation at stool is hampered

In severe cases paralysis of the *diaphragm* often occurs, when one observes that with each inspiration the pit of the stomach with the hypochondria are drawn in the high position of the diaphragm can be confirmed by percussion

The *phenomenon of the diaphrag* described by Miura (1891) is identical with the description given by Litten (1892)

The movements of the neck and head are not, as a rule, affected

The cardiac branches of the vagus and the *motor cerebral nerves* are almost always attacked acceleration of the pulse (see below) is one of the most invariable symptoms of beri beri Less frequently there is paralysis of the *laryngeal nerves* and in consequence, the voice becomes hoarse and weak, or is quite lost The *retching* and *vomiting*, which set in particularly frequently in the acute cases with fatal terminations, are

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of the vagus

With the increase of the subjective disorders the cardiac dulness becomes smaller and may disappear entirely within a few days the

lower borders of the lungs move downwards and loud resonance o[n] percussion is occasionally heard over the lungs I have only in rare cases found other cerebral nerves affected In such cases double sided facial paresis especially of the muscles at the angles of the mouth, dysphagia difficult tremulous movements of the tongue and disorders of articulation were the more prominent symptoms met with

Da Silva Lima as well as Pekelharing and Winkler, have exceptionally also observed paralysis of the muscles of the eye One of Norman's patients (Dublin) exhibited ptosis external strabismus and dilation of the pupil of one eye

Ataxia according to my experience does not occur in beri beri but on the other hand there is instability on turning sharply round and when standing with the eyes closed even in cases in which at the time there is no longer any loss of sensation Ilsberger observed the instability very often in the very first stage of the disease so that he regards it as pathognomic

The paralyses in beri beri are as a rule associated with relaxed muscles *tension of the muscles* are only exceptionally observed and according to my experence almost only on the flexor side of the leg

In rare cases which generally belong to the atrophic form a *spastic contraction of the muscles of the calves* develops gradually during convalescence Consequently when the patients have regained the use of their legs and can walk a characteristic form of gait is exhibited resembling the walk in spastic spinal paralysis the patients being only able to touch the ground with the ball of the foot The muscles of the calves, especially the inner head of the gastrocnemius may be hypertrophic swollen and elastic to the touch and the tendo Achilles thickened More frequently the contraction is accompanied by marked emaciation and induration of the gastrocnemius (see below) The muscles of the calves are in addition mostly tender to pressure and each extension of the shortened tendo-Achilles may be so painful that the patients who in other respects have complete power over their limbs do not care either to stand or walk The contraction of the muscles of the calves is generally a very tedious ailment and in some cases may perhaps never entirely disappear

In many patients *tonic convulsions* occur Painful *cramps of the calves* are most frequent they mostly set in during the night and sometimes precede the usual beri beri symptoms by a week or two Extensive tonic cramps are of rare occurrence

The following clonic forms of spasm have in rare cases been observed Tremors twitchings involuntary movements chorea or athetosis like movements or movements resembling those of paralysis agitans, and ...ually epileptiform convulsions extending more or less over the whole ...ody are observed especially shortly before death

The occurrence of extensive tonic and clonic spasms has led to the ...tting up of the above mentioned *convulsive or spasmodic form* of the ...sease

The epidemics observed by Vinson on the Island of Reunion and which commenced ...h high fever and violent spasm belong to this form

Fibrillar muscular twitchings are frequently seen in the affected ...scles

...s to the *electric condition of the motor system* the direct as well as ...indirect *galvanic stimulation* of the affected muscles is more or less ...nished even in mild cases of the rudimentary form Frequently this

diminution of the muscular reaction is exhibited particularly, at times solely, by the gastrocnemius During the further course of the disease the galvanic stimulation of the muscles decreases more and more with the degree of paralysis and atrophy, the indirect stimulation more than the direct, and at a high degree of paralysis it may be completely extinguished Occasionally also isolated muscles, most frequently the muscles of the calves, exhibit qualitative changes in the form of spasm (sluggish long drawn contraction, A S Z > K S Z), the excitability,

movement, so that while the muscles are again acting and have considerably increased in circumference, the excitability is still more or less diminished

The *faradic stimulation* of the nerves and muscles diminishes more rapidly and is sooner lost than the galvanic stimulation, and the return to normal ensues later and more slowly

The mechanical excitability of the muscles, according to my observations, decreases with the increase of the paralysis but continues longer than the electrical excitability Pekelharing and Winkler often found it heightened with simultaneous rise of the galvanic excitability

The motor disturbances are connected with the disturbances of sensation

The appearance of more or less extensive cutaneous anæsthesia or

on the toes or dorsum of the foot During the further course of the disease it extends, often very quickly, over a larger or smaller part of the legs, becoming more pronounced on the places that were first attacked, then as a rule the arms, commencing with the finger tips, are affected in their turn *Moreover the trunk, neck and face may be attacked*, in the face the muscles round the mouth are especially liable to be attacked the hyperæsthesia otherwise, not being extensive Norman, in a few cases, As a rule the hyperæsthesia gathers on the limbs it is usually more he flexors The soles of the feet arms and hands the radial side is by predilection the seat of the hyperæsthesia

In some cases the hyperæsthesia does not start in the legs, but in other parts of the body, such as the tips of the fingers, the abdomen, &c

Occasionally its spread on the two sides of the body is not symmetrical,

morning than during any other time of the day (see above, p 198)

Moreover, the weather and bodily movements influence the hyperæsthesia as it increases after motion, and in cold, and especially in wet and

from the atrophic form

Frequently the hyperæsthesia is the first symptom of beri beri and

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sensation was diminished the slightest touch elicited pain

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rably frequent and of great diversity, and may precede the other symptoms of disease The legs are their particular seat, and the weakness of the legs which forms so constant a complaint of beri beri patients, is no doubt, at all events partly, to be attributed to paræsthesia The following paræsthesiæ are, moreover, frequently observed A feeling of tension that is most frequently exhibited on the calves of the legs and may, not rarely, increase to actual pain, a sense of dragging in the popliteal space, with it may be numbness, pins and needles, smarting, burning, formication, vermication itching More rarely there is a sensation as if the entire body or a part of it were swollen or thickened, a feeling of stiffness, subjective sensations of temperature (cold, heat) In a few cases I have observed sensations similar to globus hystericus and a kind of sense of constriction

Like the hyperæsthesiæ the paræsthesiæ are also affected by the weather, being originated by wet or cold weather Cold water or a cold wind may have the same effect

Pains are not so frequent in beri beri as paræsthesiæ, but they occur on the most different parts of the body, they are, however, most frequent

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When the general condition begins to improve, the excitability, *i e*, the normal manner of reaction, usually returns, but more slowly than the movement so that while the muscles are again acting and have considerably increased in circumference, the excitability is still more or less diminished

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Occasionally its spread on the two sides of the body is not symmetrical,

Frequently the hyperæsthesia is the first symptom of beri beri and sometimes it sets in remarkably late Sensation as a rule returns to the normal state earlier than the motor disturbances

In a few of Norman's patients *anæsthesia dolorosa* existed; although sensation was diminished the slightest touch elicited pain

muscular sense

I could only exceptionally confirm a retardation of the conduction of sensation

Hyperæsthesia, general as well as circumscribed is a rare phenomenon, according to my observations Norman often found an area of hyperæsthesia round each zone of anæsthesia

Paræsthesia, on the other hand, is remarkably frequent and of great diversity, and may precede the other symptoms of disease The legs are their particular seat, and the weakness of the legs which forms so constant a complaint of beri beri patients, is no doubt at all events partly, to be attributed to paræsthesia The following paræsthesiæ are, moreover, frequently observed A feeling of tension that is most frequently exhibited on the calves of the legs and may not rarely increase to actual pain, a sense of dragging in the popliteal space with it may be numbness, pins and needles, smarting burning, formication, vermication, itching More rarely there is a sensation as if the entire body or a part of it were swollen or thickened a feeling of stiffness subjective sensations of temperature (cold, heat) In a few cases I have observed sensations similar to globus hystericus and a kind of sense of constriction

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in the calves of the legs and may be of the most manifold description (pricking pressing, dragging, cutting, dull flying) *I have also frequently* observed intercostal neuralgia and articular pains A few of Norman's patients complained of burning pains in the soles of the feet Daubler[1] saw patients who were tortured by such excruciating pains in the whole body, especially in the abdomen, that they screamed dreadfully, more particularly at night

Sensitiveness or painfulness of isolated spinous processes is frequently exhibited on palpation with the percussion hammer, more especially in those of the upper dorsal vertebræ, occasionally also this is met with as a supplementary disorder

Sometimes, especially in further advanced paralyses, there is painful ness of the nerves of the arms and legs on pressure and exceptionally also inflammatory swellings are observed on these limbs

The muscles are, more frequently than the nerves, painful on pressure Sensitiveness of the muscles of the calves is one of the commonest symptoms of beri beri Other muscles are also affected, and most extensively and severely in extreme paralysis The tenderness of the abdomen on pressure, which is especially marked in the acute, pernicious form is, at least partly, attributable to hyperæsthesia of the abdominal muscles

As to the *reflex activity* of beri beri patients, the reflexes elicited from the *skin* are, according to my observations, normal and are only exceptionally lessened or increased On the other hand, the *knee jerks*, according to Jendrassik (Pekelharing and Winkler) are frequently absent especially and almost without exception in all cases with pronounced paretic symptoms This symptom is sometimes observed only a few days after the commencement of the illness and exceeds by months, or a year and even more, all other symptoms of the disease Exaggerated knee jerk has been observed by various authors (Pekelharing and Winkler, Däubler, Grimm, Norman, Miura, Carpenter) at the commencement of the disease, and when the course is acute, Grimm regards this phenomenon as one of the most constant, and only exceptionally absent, symptoms of beri beri It is supposed to appear during the first three days of disease and to be of short duration, only existing about a week According to my observations, the reflexes of the *cremaster* and abdominal muscles are rarely absent

Serous exudations and exanthems are the most important of the *vaso motor symptoms* (see below)

[1] *Die Grundzuge der Tropenhygiene* 1895 p 97

All patients who are more or less paralysed show a considerable *atrophy* of the affected *muscles* which as a rule increases in the limbs

hidden by dropsy

particular seat of serous exudations The patients then appear as if the entire body were much swollen while pressure with the finger leaves either no p t on the skin or only here and there I have never observed this in acute cases with a fatal termination

it sometimes only develops during convalescence and may persist for years after recovery from beri beri

ion of the joints
to l e is inclined to
attr onsequence the
kne position which
wo ch of the foot

As to the remaining trophic disorders decubitus is very rare and principally occurs in complicat ons with other serious illnesses such as typhoid fever pulmonary phthisis &c In isolated cases the follow ing symptoms have been observed Furuncles (Scheube) herpes zoster (Laboulbene) erosions and vesicular eruptions often accompanied by

loss of pigment (Lasnet) and non articular inflammations of the joints (Scheube)

rarely there is heaviness of the head headaches rushes of blood to the head singing in the ears visual disturbances disturbed sleep or on the contrary *marked sleepiness at the commencement of the illness* (Carpenter) and loss of memory Consciousness is as a rule completely maintained even in the most severe cases to within a few moments before death

(2) *The Circulation* —
suffers most in beri beri
quent symptoms of dise
mild cases it only appears after violent movement of the body or after meals but during the further course of the disease it sets in when the patient is at rest by predilection at evening or night time and may become the most troublesome of symptoms It is frequently accompanied by *oppression* and *shortness of breath* These symptoms are most intense in the acute pernicious form Occasionally the patients complain less of palpitation over the heart than of palpitation in the region of the stomach

Oppression sometimes sets in not only as an accompanying symptom of palpitation of the heart but independently especially in the acute per*nicious form and is then apt to last longer and to be particularly severe* at night

Beri beri patients complain of a feeling of fulness or pressure in the region of the stomach far more often than they do of oppression in the chest this doubtless has more to do with the heart than with the stomach

... of the heart occ... in severe as well as in mild cases

trivial cause such as movements sitting up &c

Retardation of the pulse is far more rare yet it may occur I have observed it shortly before death especially in severe acute cases Els

lessened or absent and every transition is observed from a normal pulse to a sub dicrotic dicrotic super dicrotic, &c

The *action of the heart* is frequently accentuated and pulsation extends over an abnormally large area Particularly before death the phenomenon of pulsation, extending far beyond the region of the heart

the cardiac impulse

Pulsation of the

ated, i e hypertrophied and more rarely the left ventricle is simultaneously affected In consequence of the high position of the paretic or paralysed diaphragm the impulse of the heart in many serious cases is found at the fourth intercostal space outside the nipple line (Miura) Occasionally it will be found that a more or less marked hypertrophy of the left ventricle or of the entire heart is left as a heritage of beri beri

In the majority of cases systolic and exceptionally also *diastolic, murmurs* are to be heard at one or other cardiac orifice, most frequently over the pulmonary and next at the mitral valve the diastolic murmurs are possibly functional only Actual endocarditis is of great rarity in beri beri

Very frequently the second pulmonary sound is accentuated More rarely there is a re duplication of the same Pekelharing and Winkler frequently found re duplication of the first sound at the apex In several cases described by Manson and Norman the rhythm of the cardiac sounds was reminiscent of the tick tack of the clock the first and second sounds being of equal length and the intervals between the two and between the second and the following first sound being almost equal

* In acute beri beri Fieb g observed that there were sometimes systolic murmurs and *bruit de souffle* over the large arteries (carotids) Miura observed spontaneous arterial bru ts over the femoral and brach al Miura also mentions the occurrence of a certain d astolic arterial sound in the femoral which could be heard at a certain distance this was in severe cases

The blood examined during life, exhibits no particular characteristic The number of red blood corpuscles is not lessened in mild cases in severe cases a decrease is observable during the course of the disease, and the hæmoglobin is still more diminished The white blood corpuscles according to my experience, are relatively increased in severe cases

Däubler[1] in three beri beri convalescents found that the particles of fat were increased in the blood (absorption of the fat of the diseased nerves)

On chemically examining the blood it is found that there is partly a decrease of the

disease

Anæmia is a frequent but not a constant concomitant, it is rarely absent, however, in serious cases

Cyanosis is only observed in fatal cases it sets in only a short time before death

I have only observed *hæmorrhages* quite exceptionally, and in the form of bleeding from the gums and nose

[1] *Arch f Sch ffs u Tropen Hyg* 1, 1897, p 343

(3) *Respiratory Organs* —*Shortness of breath* frequently accompanies the palpitation of the heart and attains its highest degree in the final stage of the acute pernicious form The breath like the pulse is more or less accelerated as a rule even in cases in which there is no subjective dyspnœa and no palpitation of the heart

Colds in the head inflammation of the throat mild laryngeal tracheal and bronchial catarrhs occasionally occur in beri beri these sometimes introduce the disease and sometimes set in during its course I have never observed inflammation of the lungs Lasnet s patients suffered from an almost continuous tormenting cough

Œdema of the lungs is generally the finale in the acute pernicious form

(4) *Digestive Organs* —Disorders of the stomach are frequent but by ... Th ... nplaints ... this is ... There ... od and heartburn and sour eructations are not uncommon symptoms In serious cases mostly of the acute pernicious form the patients refuse almost all nourishment but are as a rule tormented by burning thirst There is occasionally an abnormal sensation of hunger The tongue is more or less coated even in those cases in which there are no disorders of the stomach

Retching and *vomiting* are but rarely concomitants of beri beri and mostly occur in the acute pernicious form accompanying the serious disturbances of the circulation and respiration that precede the fatal issue

The *stool* is frequently *constipated* *Diarrhœa* is much less common but sometimes it precedes the other beri beri symptoms I occasionally observed involuntary evacuations of fæces during the last days of life

Lasnet observed the vom t ng of *bloody muc s* in the acute pern c ous form. I except onally observed bloody stools in the acute pern c ous form and I l kew se saw v olent *tenesmus* simultaneously w th other trans ent sp nal cord phenomena suc as retent on of ur ne and decub tus

The *liver* as a rule exhibits no symptoms though in the acute form enlargement of that organ is sometimes observed Jaundice does not occur Enlargement of the spleen is not demonstrable in uncomplicated forms

(5) *Urinary and Sexual Organs* —The *quantity of urine* is as a rule diminished and most considerably so in the acute pernicious form in which it sometimes falls to 40 or even 30 ccm in twenty four hours ... of the ... ation of ... rine may even take place Every ... ed by an increase of ... the dropsical form ... d the daily quantity of urine not rarely increases to ... to 4 litres or more ... of the ... rine generally stands in direct ratio to its ... h the

Sugar has never been demonstrated but Bälz found an abnormally copious quantity of indican

Albuminuria is but seldom observed and only in the acute pernicious form during the last period of the disease

I observed one case in which several attacks of beri beri were accompanied by slight renal inflammation

It is very rarely that difficulty in emptying the bladder, cramp or paralysis of the bladder are observed

Sexual impulses and generative powers decrease and may be completely lost Thurm mentions the occurrence of painful erections and Sodré Pereira of frequent involuntary escape of semen at the commencement of the disease

In women *menstruation* is suspended during the disease and returns on recovery

(6) *Skin and Serous Membranes* —The colour and condition of the skin has already been considered

The *secretion of sweat* is frequently diminished on the affected limbs, especially in severe cases sometimes it is increased

In convalescence from severe attacks the hair of the head sometimes falls out

Exceptionally *exanthems* such as petechiæ erythema multiforme, herpes labialis, &c are observed in beri beri I have however, only seen spotty or diffuse redness in isolated cases whereas according to Miura this is of frequent occurrence and is especially observable on the

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s in intensity The

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cutaneous cellular tissue is almost free from œdema In the acute pernicious form dropsy of the cavities is also observed, but it does not

able sign

Inflammations of the serous membranes are very rarely met with in beri beri

(7) *General Condition* —In the majority of patients there is a pronounced *feeling of general indisposition* at the commencement of the illness even in the mildest forms

The *expression of*

In the acute cases w

lessness is apparent

suffering from the at

endure may be read in the countenance

The *condition of nutrition* has already been considered (see above p 212)

Fever is not a constant symptom of beri beri Many cases run their course from beginning to end without fever, in other cases a rise of temperature lasting one or several days is observed partly at the beginning of the illness partly during its course When the fever only lasts one day it is not rarely accompanied by catarrhal symptoms, when lasting longer it is frequently induced by a change for the worst, or the development of complications According to my experience the fever is never very high 39° being rarely exceeded In regard to fever, moreover, local and periodical conditions influence it

Recovery is the most frequent termination to beri beri In many cases however, *the cure is not a complete one, disorders remain for a*

following are worthy of mention Languor, heaviness and weakness of the lower extremities, particularly the legs occasionally one only being affected, contraction and induration of the muscles of the calves and disorders of mobility of the upper extremities, diminution of sensation on different spots of the skin, more especially on the legs, also a feeling of cold, of numbness pains, painfulness of certain spinous processes on pressure absence of knee jerk palpitation of the heart acceleration of the frequency of the pulse hypertrophy of the left ventricle, weakness of the heart, accompanied mostly by dilatation of the right ventricle and of œdema setting in periodically Sometimes also weakness of the memory, melancholia and enlargement of the liver, have been observed as sequelæ

Miura entirely eschews the occurrence of sequelæ He says "When kakke *terminates in recovery it is always a complete one*

I may take the opportunity of here mentioning a fact mentioned by Zwaardemaker and Kraft and which I can corroborate by a case observed in Germany, namely that in European beri beri patients who have returned home convalescence is generally very slow, and recovery may take months or even years to accomplish

The *percentage of mortality* from beri beri varies according to time ... the several beri beri countries, but

intry,

ssive

may

be taken that the *mortality formerly* was greater than it has been in recent times Of the three principal centres of beri beri the Dutch Indies, Japan and Brazil, the disease exhibits the mildest character in Japan and the most malignant character in Brazil In Japan I observed

heart, which may set in suddenly, or in consequence of *paralysis of the diaphragm*, or in consequence of the simultaneous effect of both causes, it is caused more rarely through *embolism of the pulmonary arteries*. According to Da Silva Lima *uræmic conditions* may likewise be the cause of death

ther
the

PATHOLOGICAL ANATOMY.

mortis.

swollen,
nnective
ieck are
enlarged In *rare cases the entire body is cyanotic, and covered with* extravasations under the skin

In *chronic cases* the cadaver has a pallid appearance If dropsy had
ollen, in atrophic cases,

is frequently dropsy of
frequent The effusion
Leent) Often, however,
the quantity is so insignificant, exclusive of the cases in which no fluid at all is in the pericardium, that it could only have played a subordinate part in causing death

Punctiform hæmorrhages under the visceral layer of the *serous pericardium* and of the *pleura*, are frequently met with

The *heart* is usually enlarged the right ventricle especially is almost always dilated, and it may also frequently be hypertrophied, more rarely the wall of the left ventricle is thickened

In 125 *post-mortem* examinations of beri beri cases made by Ellis the mean weight of the heart was 13 37 English ozs., while in 204 other cases the average weight was not 9 ozs

The myocardium is more or less fatty I have never failed to observe this condition under the microscope in every case. Yamagiwa, in almost 50 per cent of the cases, found the myocardium more or less opaque, or

iebig)
and
itions

of young cells into the subpericardial cellular tissue, and exceptionally I saw small hæmorrhages into the myocardium and beneath the endocardium

In regard to this cond t on of the heart in beri beri the results attained by A Hofmann (Eichhorst) *after bilateral excision of the vagus* in rabbits in which

The *blood* in the cadaver is dark red and is remarkably fluid, it is mostly found uncoagulated and on exposure to the air it clots slowly

This want of coagulation is according to Miura probably attributable to the quantity of carbonic acid it contains

Very rarely ante mortem *coagulations* from embolisms are found in the r ght ventricle, in the pulmonary arteries &c

In cases that have died from the acute form the quantity of blood that escapes even when small veins are incised, is remarkable

Lodewijks and We ss regularly found *endarteritis* of the aorta and larger arteries of the upper part of the body and regard these as respons ble for the s gns and symptoms present in beri beri Their observat ons have however not been confirmed by other observers

The *lungs* especially the lower lobes are as a rule, hyperæmic and œdematous There is frequently more or less extensive emphysema which particularly affects the anterior edges and the apices of the lungs

The *intestinal canal* in most cases exhibits venous hyperæmia in

Intesti ıal parasites especially anchylostomum duodenale and trichocephalus d spar are frequently found but are not ætiological factors in beri beri as has been asserted (Erni Kynsey)

The *liver* is often enlarged and generally congested, in consequence of the universal venous engorgement occasionally also well marked nutmeg liver is met with Microscopically as a rule granular opaqueness and fatty changes of the cellular elements are present I have several times found small granular agglomerations in the connective tissue between the lobes, as well as within the lobes

In regard to the *spleen* accounts differ Some observers found it normal sometimes even atrophic and others found it enlarged My observations are in accordance with Fiebig s and others and show that *enlargement of the spleen even though insignificant, is the rule in beri beri*

Ell s in 125 cases of beri beri found that the spleen on an average weighed 9·27 ounces in 204 other cases the average we ght was 6 ^8 ounces.

The *kidneys* usually show hyperæmia and cloudy swelling with granular *changes in their cellular elements* I several *times* found agglomerations of young cells usually beneath the capsule, and I like wise observed hæmorrhage into the pelvis of the kidneys a few times Miura several times observed glomerular nephritis

The *nervous system* exhibits the most important morbid changes and

[1] *Virch. Arch* cl 189^ No 1 p 161

it is the peripheral nerves which in beri beri form the principal seat of disease

The peripheral nerves, as seen with the naked eye, seldom exhibit any abnormality, though in a few injection of, and hæmorrhages into, the sheath as well as into the nerves themselves may be observed

Microscopically the nerves, as was first pointed out by Bälz and myself, exhibit a more or less marked degenerative inflammation, disintegration of the medullary sheath and also of the axis cylinder, increase of the nuclei of the endoneurium and beneath the perineurium, particularly in the vicinity of vessels, being noted in chronic cases, finally, increase of the connective tissue (see figs 21 24, table II)

Pekelharing and Winkler and Yamagiwa only found simple degeneration of the nerves without increase of nuclei of the vessels

A portion of the fibres of all the spinal nerves are probably attacked by these changes, they are, however, mostly found in the nerves of the limbs

The muscular branches are always affected to the greatest extent, whereas the nerve trunks exhibit few changes or may even appear normal Even purely sensory cutaneous nerves are attacked by the disease The degree of degenerative inflammation as a rule, corresponds with the symptoms of paralysis exhibited during life The highest degree is therefore observed in chronic cases while in those of the acute form,

undoubtedly connected with the different origins and the different activity of the portions attacked (Bälz)

In acute cases the disease extends to the *vagus and its branches*, the cardiac and pulmonary nerves, the laryngeal nerves, and occasionally also to the phrenics v Tunzelmann and Ellis found the nerves to the arteries diseased, and Ellis also found the splanchnics the solar and renal plexuses and the mesenteric branches affected Bälz also observed degeneration of the renal nerves in one acute case in which the secretion of urine had almost completely ceased

Degenerative inflammation of the *muscles* goes hand in hand with that of the nerves According to the degree of the disease fewer or more muscular fibres are found to be in a state of fatty degeneration, their transverse striation indistinct or entirely obliterated and the nuclei of muscle fibres increased Besides the fatty degeneration, colloid and other similar degeneration occurs in which the muscular fibres become attenuated their transverse striation is gradually lost, they become homogeneous and their fibrils

(see fig 25, table II) one fi

decreased size, large swollen

venous hyperæmia of the spinal meninges and serous effusions into the peri dural and subarachnoid spaces Microscopically the condition as a found in a few cases (proliferation of filtration of the ganglion cells in the lls of the anterior cornu) are quite unimportant or of a secondary nature

The *softened areas* so frequently met with in the spinal cord and also the equally frequent amylo d bodies are *post mortem* changes

The medulla oblongata was found normal by Pekelharing and Winkler

oblongata were normal

The usual conditions in the *brain* are according to my observations venous hyperæmia of the cerebral meninges œdema of the connective tissues and hyperæmia of the brain substance Occasionally the fluid of the cerebral ventricles is increased and œdema and anæmia of the brain substance also occur Miura found nothing abnormal microscopically

Pekelharing and Winkler could discover no changes in the *bone marrow*

The various aspects signs and symptoms of beri beri are readily explained away on the basis of the anatomical changes productive of multiple peripheral neuritis Motor and sensory paralysis at times amounting especially in the lower limbs to paraplegia advances coinci dently with atrophy of paralysed muscles

affection of the cardiac ie heart Their disease of the heart which is leads to weakness and these causes the inflam as well as the serous nce on the action of the heart

von Tunzelmann attributes the sinking of blood pressure which in most cases precedes death not to paralys s of the heart but to paralysis of the vaso motor fibres

The *serous exudations* are caused first and foremost by the disease of the vaso motor or analogous fibres In more advanced forms of beri beri they are further caused by the weakened action of the heart and the venous engorgement produced thereby, and by the altered condition of the blood which consists in an increase in the proportion of water and a decrease in the proportion of albumen

The *diminution of the secretion of urine* is explained partly by the disease of the nerves of the kidneys partly by the enfeebled action of the heart

The *spinal cord never becomes primarily diseased* in beri beri but exceptionally the disease may reach it along the nerve roots That this

happened in one patient that came under my observation would appear to be the case from the fact that the sphincters were attacked and bed sores set in

The different forms of the disease are due to the unequal degree in which the several systems suffer In the atrophic form the sensory and motor nerve fibres with the muscles are principally attacked, in the dropsical form the vaso motor nerves are affected, in the acute pernicious form the cardiac vagi, while in the rudimentary form all these various systems are frequently slightly attacked

DIAGNOSIS.

The diagnosis of beri beri offers no difficulties in most cases The following symptoms are important for the recognition of cases just commencing Diminution of sensation on circumscribed spots on the legs or feet, œdema on the inner surface of the legs sensitiveness of the calves of the legs to pressure absence or exaggeration of knee jerk, palpitation of the heart acceleration and slight excitability of the pulse, especially on movement or on assuming an upright position

Cases, however, frequently occur in which the diagnosis cannot be established and further observation of the patient is necessary This is particularly the case when the disease is preceded for some time by indefinite complaints of what might appertain equally to beri beri or any other disease, or when serous effusions into the subcutaneous tissues [illegible]

As to confusing other diseases with beri beri such a mistake is hardly possible as regards heart or kidney diseases when a careful examination has been made As to *spinal meningitis*, *tabes dorsalis*, *progressive muscular atrophy*, *anchylostomiasis trichinæ*, &c, though beri beri may bear some likeness to these it is easily to be distinguished from any one of them

PROGNOSIS.

Notwithstanding the favourable termination of beri beri in most cases it is impossible to prophecy the issue with absolute certainty in individual cases, one cannot be positive in any case that sooner or later threatening symptoms of heart affection may not set in

The *disturbances of the circulation* are therefore of great importance in determining the prognosis Should a patient early in the disease exhibit rapidly increasing cardiac phenomena, one must be prepared to expect an unfavourable termination On the other hand in patients considerably paralysed a favourable issue may be anticipated if the cardiac phenomena are absent, or if they only play a subordinate part Under such circumstances even severe cases of the dropsical form afford a good prognosis

Vomiting and circumscribed œdema may be regarded as unfavourable symptoms, increase of the urinary secretion and the return of a healthy appetite are favourable signs In Brazil also, as Feris asserts, permanent

erections and an immoderate desire for sexual intercourse, especially in *young men, is regarded as a good sign*

Certain complications exercise a great influence on the prognosis, complications with secondary syphilis, alcoholism, addiction to opium pleurisy, diseases of the respiratory organs (*bronchitis, emphysema, pneumonia*) in which the respiratory muscles are paretic and expectoration therefore impossible (Grimm), icterus from whatever cause, defective action of the kidneys, and, last but not least, dysentery, are all considered to be unfavourable signs

PROPHYLAXIS

The measures required for the prophylaxis of beri beri are —Improved means of draining the soil procuring
cleanly, roomy, and well ventilated
disease rages severely endemically it
separated from the ground by an impervious layer (cement or asphalt), so that the ground air and damp cannot penetrate

Buildings to which the virus of disease clings, such as barracks, jails, hospitals, &c, must be submitted to thorough cleaning and disinfection, regularly repeated The inmates of such buildings must be examined periodically, and those who prove to be affected with even the slightest symptoms must leave the premises The linen, clothes and other

the voyage, the patients should be placed in well ventilated cabins or brought on deck Ships on which cases of beri beri have broken out *or that have had patients on board, must be disinfected*

TREATMENT.

No specific remedy for beri beri has been discovered

The favourable influence exercised by change of climate and removal of the patient from beri beri regions to healthy high lying places has long been known The result is mostly immediate and surprisingly favourable Sometimes also removal from the house where the disease took place to even a neighbouring house has a favourable effect (Fiebig Kessler) Removal of the patient to any distance, however, can only be undertaken in mild cases or in cases of medium severity, in patients suffering from weakness of the heart or general dropsy such a proceeding would do more harm than good *Sea voyages* are as advantageous as change of climate Weintraub considers it necessary that Europeans should *return to Europe and stay there for at least two years*, as his experience in the Dutch Indies has proved that beri beri convalescents of European descent are soon again attacked if they return to the Indies after only a short stay at home

Some doctors are greatly in favour of *aperients*, especially at the commencement of the disease such as sulphate of soda, Carlsbad salts, sulphate of magnesia in large doses being preferred I was unable to obtain any beneficial results from *these drugs* *The fact, also, should not*

two drops of croton oil with 0 3 calomel

In fresh cases some doctors prescribe *salicylic acid* or *salicylate of soda* Balz made use of salicylic acid (1 0, four to five times daily) alternately with pilocarpin (0 02) and with this treatment he observed that all the symptoms of disease were removed, often in a few days I have not seen any favourable results ensue from these drugs and I am not aware if the salicylic acid has an effect analogous to those remedies of more recent date, antipyrin antifebrin, &c

Digitalis is an indispensable drug in beri beri and has rendered me good service not only for palpitation of the heart, but for dropsy also As a remedy for dropsy I frequently administered digitalis in conjunction with other diuretics, such as acetate of potassium, squills, and always at the same time
subcutaneous in
the most intens
recourse to tapp
to the hospital,
ficiency, this, h
On the other hand I am convinced that in several cases in which a rapid increase of the cardiac symptoms led to the fear of an unfavourable termination, the danger was averted by this treatment

In the place of digitalis the following are also recommended, digitalin, tinct

In acute cases with intense cardiac insufficiency, *phlebotomy* is the last resource To the best of my knowledge this treatment was first used by Marshall and it has lately been warmly recommended, especially by Anderson and Balz According to Balz it suffices to draw from 300 to 400 g of blood The favourable effect is due to the relief of the heart Personally, my experience is that phlebotomy only affords evanescent relief, and not permanent results I, however, only resolved to carry out this measure (as advised by Bälz) when I had convinced myself that there was no other resource Recently Miura has given the advice not to put off the venesection too long, but to undertake it before the cardiac action is sunk too low and whilst the impulse of the heart's apex can be still felt Miura abstracted the blood by means of cupping glasses, generally taking 100 to 200 ccm in two or three sittings, or he
to the chest of the patient while
rent to the phrenics Miura got

lts in relieving the *oppression* and
n the acute form of the disease,
they also had a good effect in allaying *vomiting*

In severe *hyperæsthesia* bromide of potassium, with inunctions of oil of chloroform, and, if necessary injections of morphia are indicated

When the course of the disease is more chronic, and more particularly during convalescence, arsenic (Fowler s solution) with iron, decoctions of quinine and other tonics should be administered

I have seen decidedly favourable results ensue in the atrophic form by

however, advisable only to commence the electrical treatment when the disease has come to a standstill (reached its maximum)

In *paralysis* of the *diaphragm*, Miura recommends faradisation of the phrenics with sponge electrodes of which one is placed over the pit of the stomach and the other behind the sterno cleido mastoid muscle at the clavicle, or both may be placed on the neck, the treatment to last five to ten minutes

I found no effect worth mentioning accrue from injections of *strychnine* which are highly recommended by some doctors

Suitable *methodical exercises* and *massage* of the paralysed muscles should be administered with the electrical treatment, along with *warm baths* and other mild *hydropathic processes* According to Balz, however, hot baths and sea baths are positively injurious

Finall

In every

first and

advise the entire avoidance of walking at the commencement of the illness, but thinks the patients should continue to make moderate movements (to induce circulation in the diseased members), while all severe

t of

etic

In

convalescents, with large appetites, Balz found a form of Weir Mitchell treatment was effective

Japanese doctors are much given to ordering a *species of bean* (phaseolus radiatus Japanese adzuki), which possesses diuretic properties, as food

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IX.

CLIMATIC BUBOES.

During recent years a number of publications have appeared

sometimes attained the size of a goose egg It consisted someti
a group of glands, sometimes of separate contiguous glands In 60
cent of the cases the swellings, notwithstanding their great size, b
absorbed, and in the remaining 39 5 per cent the buboes had
operated on Sometimes they were incised, when distinct fluctuat
in, sometimes, when the patient had suffered much or become enf

in the East Indies (31 cases to 1,000 men), China (25 per 1,000), and the West Indies (22 per 1,000); the fewest in the Mediterranean Sea (8 per 1,000), Australia (9 per 1,000), and on the west coast of Africa (13 per

regiment and one battery, 28 *came under observation in* Calcutta, 13 in Hong Kong, 4 in England, 2 in Allahabad, and 2 in Malta. Generally the appearance of the buboes was preceded by fever, which was usually remittent. The patients were frequently cachectic, and had previously suffered from malaria. Sometimes the buboes appeared while the patients were under treatment for climatic fever or dysentery.

Schon Halfhide, moreover, mentions that idiopathic suppurations of lymphatic glands occur in Coronie (Surinam) and that they are often complicated with peritonitic symptoms.

There is another statement by Nagel, who, in German East Africa, saw a number of cases of buboes in which all other etiological factors were excluded, and which therefore could only be ascribed to climatic influences; officials and planters who had been in East Africa over a *year were mostly affected, and a certain proportion of the cases had* suffered, or were still suffering (2 cases), from malaria. In no case did the fever exceed 39°, and in only two patients did suppuration set in,

were more or less painful
lling becoming perceptible
e in the inguinal region.

Recovery was comparatively quick, and the fever abated after the local affection had healed.

In Japan (Kioto) I myself observed sixteen similar cases. The *glandular enlargement affected the inguinal glands with the exception of* one case, in which the femoral glands were affected; the enlargement was mostly on one side, only in one case was it bilateral. In four cases there was suppuration, the abscess either opening spontaneously or it was incised. The disease sometimes had an afebrile course, and was sometimes, especially at the beginning, accompanied by fever, which in one case preceded the ap

were amongst them. The majority
mn. Most of
iber, and from
to the season
in which the disease appeared.

There is no doubt that all these observations relate to the same ailment. Even though the clinical features of the *disease drawn* by different authors are not similar in all points, yet they show no greater
observed group of cases do
the disease with *malaria*. Ruge
use of his cases because he has
the fever, which previously had
defied quinine, disappeared as soon as the diseased glands had been

removed and amongst the numerous cases of malaria that were observed simultaneously in the blockade squadron not a single case was com [illegible] asserts that [illegible] Nagel found [illegible] the disease [illegible] ite nor could [illegible]

Probably several other observations belong to the same illness although these are summed up by the various authors who communicate them as a form of malaria

Martin observed that in Deli on the north eastern coast of Sumatra patients [illegible] nted initial or more [illegible] ver accom panied [illegible] rely of the femoral [illegible] ry painful but ofte [illegible] by change of climate or as by Priessnitz with graduated compresses quinine arsenic and iron &c the fever and swelling quickly abated when sup puration occurs the pus burrows and leaves ugly fistulous tracts difficult to heal while the cachexia rapidly advances

Martin considers these cases are of a malarial nature from the fact that they occur in malaria convalescents or malarial cachectics and [illegible] loses its significance

The only valuable proof namely examination of the blood is not stated as having been made

[illegible] in consequence of the participation of the peri glandular tissue the swelling at times attained the size of a hen s egg and increased at every attack of fever and became somewhat painful The fever disappeared after a few days under anti malarial treatment (quinine cinchona powder, arsenic) while the glandular enlargements [illegible] Lesneur Florent is himself [illegible] s a subordinate part in the [illegible] s Martin s cases most pro [illegible] so holds good for the other [illegible] ar Ruber Potschuh)[1] (see [illegible]

[1] The form of lymphangitis described by Roux (Traité pratique des maladies des pays chauds [illegible] pp 1 [illegible]) in which Ruge includes this ailment is according to my

We have here an ailment that undoubtedly possesses a large geographical distribution, appearing to exist in Europe also, though having its principal distribution in East Africa, Madagascar, the East Indies Sumatra, China, Japan, and the West Indies, some of the English

mesenteric glands This view, however, finds no support from other observers

Cantlie has pronounced another opinion on this disease, which he ... buboes have ... called *pestis* ... propounded ... disease thus ... not probably ... lly resemble them

In no case can pestis minor be made to include climatic buboes, as Cantlie strives to do The objection raised by Godding that idiopathic buboes occur on the East African coast where plague does not exist is done away with by Koch s discovery of a plague centre in the interior of Africa, in Uganda On the other hand, the cases observed by me in Japan in 1877 1881, long before plague was extant in China and India,

be left for reply to future investigation Only this much may be said, that the affection is caused by some still unknown factor that has undoubtedly some connection with climate

In this sense the present designation, "climatic buboes" is unprejudiced and suitable until a better title can be found in substitution

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opinion erroneously placed The mild form that mostly occurs on Réunion is undoubtedly a filarial disease, *while I do not attempt to classify* the severe form observed in Rio de Janeiro (see p 143).

X

LEPROSY.

DEFINITION.

Leprosy is a chronic infectious disease, which for the most part is incurable, and is caused by a specific bacillus In this disease more or less circumscribed neoplasms, tending to become granulomatous excrescences develop these are principally situated in the skin, in mucous membranes and in the peripheral nerves

DESIGNATIONS.

The disease has a number of names which, originating from the most different countries and periods, mark its distribution in different regions and ages *The best known designation is Lepra*[1] *Arabum* (*i e*, scriptorum) and *Elephantiasis Græcorum*, by the term lepra Græcorum psoriasis is understood, and under the term elephantiasis Arabum, the

As may be gathered from the designations and descriptions which have been transmitted to us from ancient and mediæval times, many other chronic skin diseases such as those of syphilis, lupus, scabies eczema, psoriasis &c., were confused with leprosy

[1] The word "lepra" according to Bloch, is derived from the Indo-Germanic root "lap" = to peel, and indicates a scaly and contagious skin disease

HISTORY AND GEOGRAPHICAL DISTRIBUTION

(See Map III)

Probably Egypt, and more particularly the region of the Nile, is to be regarded as the home of leprosy, at all events this country at the most remote period was one of the principal seats of the disease According to a papyrus discovered by Brugsch, the disease prevailed in Egypt 2400 years B C, and according to Engel Bey, it was mentioned in a papyrus as existing there about 4260 B C Leprosy is also alluded to in the Old Testament There it is mentioned in various parts under the name of saraat (eruption crushing blow), a disease which is minutely described

also included

In India, and perhaps in China also, the disease has been known since ancient times, and it can be traced back in Indian inscriptions to 700 B C (Hirsch)[1]

In *Europe*, on the other hand, leprosy appeared later, the first

over the greatest part of Europe, Roman colonists and soldiers carrying it into the countries invaded by the Roman legions, and the migration of people continued to disseminate the disease Leprosy prevailed in Europe to the greatest extent towards the end of the thirteenth century, and was much contributed to by the crusades and the consequently *increased commerce with the East*

Leper asylums were established everywhere and in these the unfortunate lepers banished from human society, dragged out their miserable existence This expulsion was conducted with a religious ceremony of the character of a funeral sc
dead to the outer world
and to carry a particular s
their approach from afar
scrupulously avoided touching them, and people were even afraid that the *wind blowing over these unfortunates could convey contagion* In the fourteenth century leprosy commenced to decrease gradually in Europe and disappeared during the course of the century from our continent,

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also
era
ark
ear
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[1] The disease sâraat has been variously described Squire considers it especially to ... and Hebra takes it for scabies Dunbar Walker considers it to be

centuries B C

Ionic Islands Crete Cyprus in Servia Bulgaria Roumania Hungary Galicia Poland Bessarabia Jekaterinoslaw in the region of the Don in Astrachan Livland Courland Esthland Finland Sweden (especially in the province Helsingland likewise in Angermannland Jemtland

coast

Quite lately a small centre of leprosy has also been discovered in Germany this is situated in the region of Memel and it was probably brought there from Courland at the end of the forties According to Kirchner there are 16 decided and 4 doubtful cases at Memel at the present time and these originated from three centres of which the first is situated in the suburbs of Schmelz Sandwehr Bommelsvitte north and south of the town on the Baltic Sea and Courland Bay and in the fishing village Melnerraggen The second centre is formed by a group of villages at the north east angle and the third centre by another group of villages at the south eastern angle of the district close to the Russian frontier (Blaschko)

On the whole leprosy has gained some hold in Europe lately Arning computes that the number of endemic cases in the western half of Europe at the present time is equal to 3 000

In *Asia* the region of distribution of leprosy is a very large one and extends over the Caucasus Asia Minor Syria Palestine Arabia Mesopotamia Persia Turkestan particularly Bokhara Samarcand Miankal and Hissar it prevails in India Ceylon Further India the Malay Archipelago in China the Kwang tung and Fokien provinces are the principal centres and from these districts the disease has been carried by Chinese to the islands and coasts of the Pacific Ocean in Formosa

increased in the islands of ... the Cape

leprosy existed ... trance of the Spaniards[1] leprosy now exists in New Brunswick British Columbia

a few spots of the United States namely—Wisconsin Iowa Louisiana California Minnesota where the disease has been carried in by Norwegians and Chinese In Mexico the disease is met with and in the West Indian Islands (more particularly Trinidad where leprosy was unknown before the advent of the African negroes) In Honduras Costa Rica Columbia, Ecuador Venezuela Guiana Brazil (in the provinces of Para Pernambuco Bahia Matto Grosso, Minas Geraes San Paulo Parana) leprosy is known, being introduced there by negroes or Portuguese In Paraguay and the northern parts of Argentine and Uruguay, *lepers also exist*

[illegible] New South Wales Victoria Queensland Western [illegible]

[illegible] Sandwich Islands [illegible]

[illegible] in the *leprous countries* is [illegible] centres while the remainder [illegible] under the same conditions of [illegible]

ETIOLOGY

Leprosy is originated by a definite bacillus the *bacillus lepræ*, which was discovered by Armauer Hansen (1871) and more minutely studied by Neisser (1879) the bacillus has hitherto only been seen in leprosy and indeed is found in all forms of the disease, but has never been discovered in any other disease This bacillus (see fig 27 table I) [illegible] the length [illegible] simi [illegible] olour as the latter being stained a fine red colour with blue cytoblasts by fuchsine aniline water followed by acid treatment and contrasting dye with methylene blue They can, however also be stained in simple watery alcoholic solutions of aniline dyes *According to recent investigations*, however the latter method also succeeds with the tubercle bacilli There is therefore no essential difference of colouring between these two *micro organisms only a difference in degree*, *so that a few investigators* such as Danielssen and Rake are inclined to think them related if not identical

Babes was able to confirm club like formations and ramifications in the bacillus lepræ resembling those of the tubercle bacillus he therefore classifies both as [illegible]

[illegible] not bacilli but granular [illegible] processes in masses of [illegible] are therefore different.

[illegible] unding bacillar mucus

[illegible] hat

Hansen and Looft lay particular stress for differentiation of the two bacilli on the fact that the tubercle bacilli are mostly found singly, while

The bacilli lepræ according to Cornil may attain a far greater size five to six times the length of those in the skin and mucous membranes in parenchymatous organs, which, like the liver are softer than the skin and the same is the case in the lymphatic spaces of glands

The bacilli are surrounded by a relatively broad mucus envelope which is observed most distinctly in dry preparations stained with watery aniline solutions

They do not always become evenly stained but frequently exhibit an arrangement of the protoplasm resembling a pearl necklet The unstained parts have been indicated by Neisser as spores Probably, however, these are nothing but a disintegration of bacilli

In fresh unstained preparations the leprous bacilli exhibit a lively *spontaneous movement* (they dart to and fro) and this is also observed in intracellular bacilli

It is difficult to *cultivate* the bacillus lepræ artificially Hitherto no success has been achieved in gaining cultures free from suspicion It is true that investigators have cultured bacilli from leprous tissues and secretions but it is doubtful if these are identical with the bacilli of leprosy A number of observers (Bordone Uffreduzzi Giarturco, Babes, Levy, Czaplewski, Spronck, Barannikow, Teich) certainly appear to have obtained one and the same microbe in their cultures, and they all possess a certain fixity of decolouration

The long discussion as to the *situation* of the bacilli in the tissues, carried on between Neisser and Hansen on one side, and Unna on the other, may now be satisfactorily decided by the fact that the position of the bacilli may be *intracellular* as well as *extracellular* When free they may be observed, sometimes isolated, sometimes in groups In the interior of cells they lie either in little heaps or they entirely fill the cell In the uppermost strata of the neoplasms in particular, peculiar large round sharply bordered heaps, the so-called *globi*, are encountered, these, when uncoloured, exhibit a wax like polish, and stain almost homogeneously with aniline dyes Opinions are divided as to the nature of these heaps, which are identical with the "yellow

ent re families

A fact that likewise speaks strongly in favour of the theory of the capacity of infection of leprosy is the circumstance that *in recent times leprosy in different countries has considerably decreased under the influence of the introduction of isolation of the afflicted*

The expulsion of lepers from human companionship also plays a large part in the disappearance of leprosy from Europe in the sixteenth century

In isolated cases it is often very difficult to trace the source of infection, and this is not surprising when one takes into consideration that the etiology of many cases of diphtheria, scarlet fever, cholera, &c, *remain unexplained notwithstanding their sudden outbreak and their* [illegible] whereas in leprosy years may elapse after the [illegible] of disease sets in, and then only very [illegible] great number of cases in the literature in which transmission of the disease can be positively traced, and of these a few examples are here given

Hawtrey Benson's case is one of the most convincing This observer, in 1872, exhibited to the Dublin Medical Association an Irishman suffering from nodular leprosy, who had lived in the West Indies twenty two years and there acquired the disease After having been under treatment in hospital for a few weeks he returned to his native land and there died about eleven months after The patient's brother slept in the same bed with him until shortly before his death and wore his clothes. This man had not left Ireland, where leprosy is unknown for forty six years, had

only once been in England, and no other case of leprosy had occurred in his family In 1877 he was shown at the Dublin Medical Association, also suffering from tubercular leprosy

Lorand mentions a case from Sweden a soldier who had just left the service, bought and wore the clothes of a leper who had ulcerated nodules on the legs. The soldier wore the clothes and subsequently developed leprosy and likewise had nodules

for fifty years.

Hellat reports that a woman not afflicted by hereditary leprosy, and who lived in a district of Russia, in which cases of leprosy had not occurred within the memory of man, fell a victim to leprosy three years after the return of her son, who had been in service by the Caspian Sea

in close association with

The only daughter of a

was found that she had

d, who subsequently died

which she acquired from

kept by her Afterwards the mother became infected through nursing her daughter.

A juggler, who only visited places free from leprosy, but who for a long time had a travelling companion who was obviously leprous,

an syphilis, and probably

possibility of infection of leprosy is the fact that in marriage one of a couple is very frequently leprous without infecting the other, and that it is exceedingly rare that the disease is observed amongst the doctors and attendants at leper asylums

In 1892 I visited a leper house in Hendella, near Colombo, in Ceylon, which had already existed more than a century having been built before the period when Ceylon passed into the possession of the English from the Dutch in 1796. For generations the offices of sick attendants have been handed down to certain families living on the premises, and yet I was assured by my conductor a doctor, that no case of leprosy had ever occurred amongst them.

The same, however, is also the case in other contagious diseases Transmission seldom takes place in the marriage of tuberculous persons and cases of infection are very rarely observed in the syphilitic wards of hospitals Nobody will assert that these two diseases are not contagious It must also be added that contradictory observations in regard to leprosy have been made Thus Emerson, in 1888, by desire of the Government of Honolulu instituted enquiries on the subject and found that of 66 so called kokuas, i e, male and female attendants on lepers on Molokai Island (who were as a rule married to the patients) 39—59 per cent—became leprous after a stay of from two to fifteen years, 11 were doubtful and 16 not leprous

On the whole the contagious nature of leprosy *in different countries is* not similar appearing to be greater in the more recent centres of leprosy than in those where leprosy has been endemic for ages Perhaps in the course of tens of centuries the virus of disease has decreased in virulence, or by the destruction of the most susceptible individuals a natural immunity may gradually have been formed

In regard to contagion, the nodular form appears to be more dangerous than the anæsthetic form, and this may be explained by the fact that in the nodular variety there are myriads more bacilli than in the anæsthetic, in which also there are no secretions containing bacilli Hansen, by means of *statistics* proved that the increase of *fresh cases of leprosy is* greatest in those districts of Normandy where the most nodular cases occur

The transmission of the disease takes place from man to man, directly or indirectly The different secretions and excretions of lepers in which, as mentioned above the bacilli of leprosy are found, may become the carriers of the virus of disease Transmission may also be effected by the use in common of utensils for eating and drinking, wash tubs, towels, clothes and the like (see Lorand s case mentioned above, similar cases are also related by Hansen and Looft) Transmission by means of

We do not know

ance that they are

any length of time,

can originate the

disease Geill is of opinion that the bacilli go through certain stages of development in the soil before invading the human organism

The introduction of the bacillus lepræ into the human body may

The *mucous membranes*, more particularly the nasal mucous ...

form another point of entrance Sticker is even of opinion that in leprosy, as in chronic glanders, the primary effect has always its seat on the *mucous membrane of the nose* and that leprosy therefore primarily is a nasal disease in a still more limited sense than syphilis is first a sexual disease, and tuberculosis a disease of the apices of the lungs The lymphatic glands of the nasal mucous membrane are connected with those of the skin, with those of the sub arachnoid spaces of the brain, and ... and the perineural sheaths of the peri...

e bacilli are able to spread through

cilli may also take place through the *sebaceous glands, hair follicles,* and *sweat glands,* in which and in the vicinity of which, bacilli are frequently found, or they may perhaps

penetrate by way of the *respiratory and digestive organs* Kolle states that Black was able to prove that in the early stage of nodular, as well as of nerve leprosy the spleen and liver may be crammed full of bacilli ... changes of the skin are scarcely perceptible, this speaks

... ransmission

... se in certain
... d of incuba
... by way of

It has already been mentioned above that ... ems to have played a large part in the spread of leprosy in the Sandwich Islands The possibility of such a manner of transmission even at a time when no pronounced symptoms of the disease are present is proved by the *cases communicated* by Gairdner and Daubler

... nated h ... ch ld with

Objectors to vaccination have availed themselves of the part played by vaccination in the dissemination of leprosy and to exaggerate the possibility of infection In their blind zeal they have even gone so far as to ... and almost everywhere ... to every doctor in ... o they have come ... o case of the kind ... Norway for ...

... ie transmission of leprosy

In medical literature different cases are mentioned in which leprosy developed in *conjunction with a syphilitic infection*, and I myself observed a case of this kind This may raise the question as to whether the individual afflicted with both diseases may simultaneously transmit a syphilitic virus with the virus of leprosy

The *incubation* period in leprosy may last for years This is proved in the case of patients who several years after leaving leprous countries develop the disease

A v Bergmann has, from the summing up of all communicated

incubation in the multiplicity of cases does not exceed two years Cases with periods of incubation of ten, fifteen, twenty years, or even longer, have been communicated
period was thirty two years, but
cism as the patients during these
carefully observed and isolated
escaped the attention of such pers
other and more perceptible symptoms (see below)

The question of the *heredity* of leprosy stands in a certain antagonism to that of the contagion of the disease Those who deny the contagiousness favour the theory of heredity Danielssen and Boeck especially *favour the opinion of heredity from the father s side* The assumption of inherited transmission is founded on the circumstance that a large

household and of close intimacy

whom many came from leprous districts, yet not one developed the

confirmatory —

Ehlers examined 119 cases in Iceland whose family history could be minutely traced, as the Icelanders have complete tables of their pedigrees Of 3 of these both parents were leprous of 15 the father only was a leper, of 4 the mother only was leprous and of 20 the brothers and sister were diseased

The above mentioned examples of contagion declare against the heredity of the disease, as well as the following facts —

(1) *The lack of a fœtal form* (in contradiction to syphilis) —A few observers, notably Zambaco, state that they have observed signs of
leprosy at bir
are by no me
the sense of

(2) *The marked lesions of the generative organs* in both sexes which set in early in the disease so that the sexual functions of the patients are soon diminished or extinguished also declare against heredity It has been ob erved in India that almost two thirds of the marriages of lepers are childless (Azoulay) Should leprous women conceive, they mostly miscarry, according to Zambaco, in the third or fourth month of pregnancy, or the children are born cachectic and soon die

(3) *The rapid disappearance of the disease* as observed in a few regions, such as in the Faroe Islands and on the coasts of the Bohuslan in Sweden (Hjort) tend to nullify the belief in heredity

Probably, however the *pre disposition* to leprosy is *hereditary*, that is to say, there is but a small power of resistance to the invasion of the bacilli Kaurin considers there is a hereditary susceptibility from the fact that when one of a married pair is leprous the other sometimes remains free from the disease and is sometimes infected in the former

the fish theory has been brought forward again by Hutchinson—the inordinate eating of fats or rancid oils, the immoderate eating of pork, the eating of bad cheese bad sorts of flour, putrid olives or other raw foods want of salt in the food have all been assumed to be causes of the disease without any proof whatever

Race plays an important part in the etiology of the disease In countries with a mixed population the white race is far more rarely attacked than the coloured especially the blacks In half breeds the immunity is decreased

Besides the difference of race the *hygienic conditions* under which the people live as well as the *intercourse* they have *with the infected part of the population*, come under consideration According to Munro the Arabs for instance ...

... years

Constitution exercises no influence but the *predisposition* is *individually different* Isolated persons seem to enjoy complete immunity R Koch furnishes the following examples —

In infected districts the dis

the country than in the towns

means exclude the occurrence c

poor living in dirt, misery and

disease Deficient care of the skin, personal uncleanliness, dirty and miserable condition of the dwellings and clothes, and close quarters of the inmates, all undoubtedly play an important part in the spread of the disease, for reasons readily understood They also contribute to the fact that the contagiousness of leprosy varies in different countries and in different nations Thus in Japan, the population of which are a cleanly

The cleanliness in towns is even greater than in the country, and correspondingly leprosy is more frequent in rural districts, the villages of the Eta—the Japanese pariahs which are notorious for their dirt—are particularly centres of leprosy In Constantinople, according to v During, leprosy has been particularly observed amongst the Spanish who live under inferior hygienic conditions to the Turks and Greeks

Hansen attributes to the cleanliness of the descendants of Norwegian

t not

too

rosy

ienic

on of

the shirt and chemise as a universal article of clothing, these garments in mediæval times having been regarded as merely an article of luxury

SYMPTOMS AND VARIETIES OF DISEASE.

The signs and symptoms of leprosy depend on the seat of the leprous neoplasms The symptoms differ according as the neoplasm is situated in

These differences

of two forms of

originated with

tudy of leprosy

point, are never

theless not strictly divided one from the other, for they frequently overlap,

the symptoms of one form being oft

during the course of the disease or e

very seldom that quite pure cases of

the majority belong to the mixed fc

differentiate further forms according to the prevalence and succession of particular symptoms as various authors have done

The disease is almost always incurable. *Death* ensues finally, either from exhaustion, or from complications with other diseases that are directly or indirectly connected with leprosy. The most frequent of these are chronic diarrhœa, erysipelas, pyæmic conditions, pulmonary and renal diseases, and amyloid degenerations, the last named, according to Havelburg, occurring in patients who have suffered loss of strength from the discharge of pus, &c

According to statistics compiled by Hillis as to the causes of death, the direct consequences of leprosy are responsible for 38 per cent nephritis causes 22 5 per cent of the deaths, lung diseases, including phthisis, 17 per cent, and diarrhœa is responsible for 10 per cent of the deaths

As recent investigations have proved, the so called pulmonary phthisis of lepers is frequently caused by *leproid neoplasms in the lungs*, and the

2. Nerve Leprosy.

(Lepra nervorum, anæsthetica, maculo anæsthetica, glabra, non tuberculata, mutilans, antonina, mal de San Antonio [Columbia, Mexico])

(See fig 29, table IV.)

In nerve leprosy, as in nodular leprosy, the actual outbreak of the disease is preceded by *prodromal symptoms*, which, besides *attacks of fever*, are principally of a *nervous* character Rheumatic or neuralgic *pains* (dull, darting, or piercing), occur in paroxysms in various parts of the body and may be combined with paræsthesia (formication, tingling, numbness, a sensation of heat, itching), the members thus affected frequently swelling and becoming red and hyperæsthetic *Hyperæsthesia*, sometimes local, sometimes more extensive, may set in, occasionally every part of the body is painful on touch and movement Hyperæsthesia of the organs of sense (pains in the eyes and photophobia, and also sensitiveness to noise) may appertain to the prodromal symptoms Danielssen, as also Hanson and Looft, mention the occurrence of slight

observed periodical *flushing of the face* and *twitching of the facial*

grow, enlarging from their periphery, while the centre again becomes

(Brieger)

The spots may appear on various parts sometimes on the face some times on the neck on the trunk or on the limbs I have also occasionally observed such spots on the hairy parts of the head I have never been able to confirm the symmetrical arrangements of either macules or nodules insisted on by some authors Occasionally the spots cause the patients slight pains a sense of heat tension or slight itching Although they may vanish from isolated spots they persist at other places and the primary hyperæsthesia gradually changes to anæsthesia

During the further course of the disease the spots became darker and assume an ashen grey sepia brown or blackish brown colour (*Lepra* [illegible]

[illegible] the illness has not as yet made further inroads whilst in other instances the anæsthesia persists, and the patches become transformed into unpigmented spots that occasionally are quite white (*Lepra alba*) The white [illegible]

[illegible] symptom which is more especially observed in the initial st ge o the disease The blisters most frequently make their appearance on the limbs especially on the knees elbows the backs of the hands and the dorsa of the feet In three cases Leloir observed them on the mucous membranes Mostly one blister only forms more rarely several appear simultaneously Occasionally they are induced in consequence of burns or other traumatic influences often, however without any such cause Frequently they set in with remarkable rapidity and persist for several hours or days After having burst there is an excoriation which is at first red and shiny and later exhibits a thin whitish yellow coating and when healed sometimes leaves either a dark pigmented or white [illegible] however there remains an anæsthetic spot [illegible] r In consequence of marginal [illegible] esult from the *blisters* The [illegible] ntervals often for years They [illegible] account of their similarity to pemphigus blisters

Independently of the spots described above and occasionally even before their appearance *there sets in a gradual decrease of sensibility*, first [illegible] h d sp ces of sk n and later on to a great extent over the [illegible]

becomes more or less anæsthetic

As to the various *sensory qualities* they may be almost equally *attacked more frequently* [illegible] ment of the disease the sensations of p [illegible] (*dissociation of sensibility*) occur which affect the sen [illegible] in the most manifold com [illegible] sensation has also been ob [illegible] cold object on insensitive parts, the patient at first only becomes aware

of the contact, but after from five to eight seconds he feels a slight sensation of temperature, the more the disturbed sensibility the slower the perception ensues Often there is perversion of sensation, instead of cold, heat is felt or a simple prick causes a relatively long sensation Frequently the delay inducing sensation is very pronounced only after repeated stimuli at the same place sensation is at last elicited (Jeanselme) The muscular sense and the appreciation of the position and placing of the limbs always remains intact After the skin the less superficial parts down to the bone may be attacked by paralysis of sensation

entirely destroyed Of 24 cases observed by Jeanselme, 4 exhibited normal knee jerk 6 diminished or extinguished knee jerks and 14 increased patellar tendon reflexes According to A v Bergmann the reflexes are not essentially altered

The *nerves* appertaining to the parts of the body attacked are often *thickened* and present either knotty or spindle shape enlargements. This according to my experience, is most frequently observed in the great auricular nerve and ulnar nerves more rarely in the peroneal and more seldom still in the radial median and supra clavicular nerves According to Bälz the great auricular nerve is of particular importance for diagnosis as he found it thickened in 90 per cent of all cases In rare cases he also observed thickening of the facial and supraorbital nerves The most extensive indurations occur in the ulnar nerve the diameter of which above the elbow joint is occasionally greatly increased At the commencement of the disease the nerves are exceedingly sensitive to pressure, ch induces neuralgia and paræsthesia in them, or increases the pain t As the disease advances the sensitiveness of the nerves gradually ears

or disturbances are introduced with the alterations in sensation, o the same extent for with them it is not the question of actual but of *atrophy of the muscles*, and in consequence the decrease r power The decrease of muscular power is generally on a e diminution of the size of the muscles The disturbance ly affects the face, the hands and the feet the muscles not apt to be atta[illegible] to an equal degree, for of muscles same [illegible] in the *bones*, [illegible] to each other some may be sue case as a rule The pha[illegible] through suppuration, the sub[illegible]sed to a variable extent retracts [illegible] expression and has a

In yet other cases the mutilation is caused by sim[illegible] ased by periodical *tissues* Bälz describes this process which he regards [illegible]ression of idiotic of the mutilations, as follows [illegible] softens the lime salts [illegible] the articular ends of [illegible] experience the same [illegible] In the meantime, or somewhat later, the same process beg[illegible]biculars second phalanx and finally in the distal phalanx, the upper end of [illegible] bearing the nail, resists longest The soft parts covering the bone [illegible]ower

punctum lachrymale is separated from the eyeball, causing the tears to flow down over the cheeks, and this imparts a still more pitiful expression to the countenance The muscles of the eyes also may be attacked separately (strabismus, diplegia), or together (ophthalmoplegia) (Jeanselme)

In consequence of the defective closing of the eyelids the eyes suffer, and more particularly is this the case if the anæsthesia of the conjunctiva and cornea are induced by disease of the trigeminal nerve Ulceration of the cornea frequently results, and may lead to perforation or staphyloma, and finally to atrophy of the globe, or xerophthalmos with a condition of the cornea resembling mother of pearl may develop

In a series of cases, v During and Trantas as also Bistis observed black white and mixed *spots* of various shapes in the choroid more especially in the peripheral parts

Motor feebleness is perceptible in the *hands* the patient cannot hold

inwards to the palm, the first phalanges being extended (*claw like hand main en griffe*) Connected with the claw like hand there may be a deviation of the four fingers to the ulnar side, caused probably by acute attacks of pseudo rheumatism (see below) Contractions of the fingers particularly the fourth and fifth, are not rare, and according to my *observations, belong to the earliest symptoms of disease, even preceding* the appearance of anæsthesia, muscular atrophy, paralysis and cutaneous eruptions

Moreover the *arms* and *legs* are attacked, and their movements, in consequence, hampered The muscular system of the ulnar side of the forearm is the first to become atrophied, the radial aspect is only affected much later, the muscles of the legs become atrophied at a later period still, and to a much less degree The toes may become contracted as *well as the fingers, but this is of rarer occurrence, to a slight degree* also the arms and legs may also be contracted I have never observed complete paralysis of the limbs as a rule, the patients are able to walk and move their hands

The *electrical excitability* of the atrophied, paralysed muscles diminishes, the indirect even more than the direct (Bidenkap and Leegaard), and in a few muscles, as F Schultze first pointed out, a complete partial

ings are, more
pending to nd
he entire limbs
The *face* also

Disturbances of anæsthetic
disturbances in thous *sensory qualities*, they may be almost equally
dry, rough, lust frequently
in large flakes sations of p
fingers and *sensibility*)
appears in affect the senses
and feet, st manifold combinations Retardation of the conduction of hyperpl has also been observed (Neisser) On the touch of a warm or some object on insensitive parts, the patient at first only becomes aware

middle of the leg Hansen and Looft also frequently observed darkly tinted and usually symmetrical hyperkeratoses on the anterior aspect of the legs and on the backs of the hands

The *hair* becomes dry and brittle and falls off, according to my

entirely

The *tendency to ulceration* is another consequence of the disturbed

little tendency to granulate they persist for months and years They have hard callous borders and a completely atonic base which secretes a scanty opaque viscid fluid On the soles of the feet the ulcerations frequently appear as perforating ulcers, they are round and have a sharp border, appearing as if cut out with a punch In other cases they assume the form of fissures and rhagades with hard callous edges and smooth pale red bases, which run obliquely in the flexor folds of the fingers and palms of the hand

[illegible] frequently it is not the third or terminal

process may have its origin in the *bones*, according to A v. Bergmann and Gerlach this is the case as a rule The phalanges become necrotic and are then cast off through suppuration, the surrounding soft parts then retracting

In yet other cases the mutilation is caused by simple *absorption of the tissues*. Balz describes this process, which he regards as the usual cause of the mutilations, as follows First, the central piece of the first phalanx softens, the lime salts disappear, and a sort of pseudo arthrosis ensues, the articular ends of the phalanx approach one another, and gradually experience the same fate, the finger becoming then shorter by a joint. In the meantime, or somewhat later, the same process begins in the second phalanx, and finally in the distal phalanx, the upper end of which, bearing the nail, resists longest. The soft parts covering the bone become

shortened simultaneously with the bone The nail also gradually dis

toes

In rare cases the loss of fingers and toes is effected by means of an *ainhum like process* (see ainhum) Ehlers, in three cases, observed ainhum like grooves at the toes

Nerve leprosy is also entitled *Lepra mutilans*, on account of the mutilations to the limbs that take place in the course of the disease

A sort of osteo malacia has also to be mentioned amongst the trophic disturbances The members attacked by it assume eccentric forms which Danielssen and Boeck compare to the fin of a seal (Jeanselme). *Crippled and atrophied conditions of the feet* are also observed corresponding with Charcot's "*pied tabétique*" (Heiberg) Hansen and Looft, moreover, mention the occurrence of *acute rheumatoid articular affections* accompanied by effusion in the earlier stages of the disease They generally

Gastralgia was observed by Danielssen and Leloir, and the latter compares it to the gastric crises of tabetics

Sexual functions, as in the nodular form, gradually decrease in both sexes and finally cease altogether

The patients become feebler and feebler, their bodily temperature sinks and the action of the heart is impaired

The intelligence of the patients is maintained intact for a long time, but there is a mental and *moral obtuseness about them.* As Corre strikingly expresses it "*C'est avec une sorte de stoïcisme indifferent que*

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eighteen or nineteen years for nerve leprosy, and eight or ten years (Danielssen and Boeck, Bidenkap) for nodular leprosy. In the Baltic provinces the duration is respectively eighteen years, and nine or ten

and nine years three months for the mixed forms, these figures being the

of the disease is essentially influence
bestowed on the patients and their m
ance of intercurrent diseases that
some circumstances the duration of
as proved in the case (mentioned by
in the leper asylum at Rio de Jan
years.

In most leprous countries the anæsthetic form is the more frequent, but in a few places, such as Norway (Memel) Spain, Portugal, Madeira, Trinidad, Brazil and in the Sandwich Islands, the nodular form is the more prevalent

It has been asserted that the form of the disease depends on *climatic influences*

Besides the well marked forms, cases occur in which there are only one or two symptoms of leprosy, mostly confined to one limb, for instance, circumscribed anæsthesia on the forearm, particularly in the ulnar region, with contraction of one or two fingers, anæsthesia and

blisters formed on the right knee several times a year, these changed into ulceration, which on healing left anæsthetic places, so that gradually the entire knee and its vicinity had become anæsthetic. The patient besides had lost the hairs from his eyebrows, but there was a complete absence of all other symptoms of leprosy, although the disease had already persisted for eighteen years. Besides Arning and myself, Zambaco, Morrow, Coffin, Ehlers, v. Bergmann and Crespin have described cases of this kind

There occurs in the Pyrenees especially in the district of Béarn, a disease that is there well known. It consists of deformity of the nails and finger tips with the subsequent loss of the last phalanx, and alopæcia The disease is regarded as a form of leprosy gradually weakened by inheritance (Magitot, Regnault Layard and others). The sufferers are called *Cagots* a word Magitot considers corresponds with *Cacou* the Celto-Bretonic term for lepers

Occasionally *complications* of
syphilis (in Norway this mixed
arabum, eczema, psoriasis, favu
scabies is the most interesting Horny, dry scabs, often several centimetres thick, form on the extremities and other parts of the body, the

acarus is not felt in consequence of the anæsthesia of the skin, and therefore the action of the acarus goes on unchecked (*scabies norvegica* or *crustosa*)

PATHOLOGICAL ANATOMY.

In the *nodular form* circumscribed *nodules* or *diffuse infiltrations* are found in the skin and mucous membranes The nodules consist of a jelly like, yellowish white to reddish black substance permeated by a voluminous vascular network On section this substance exhibits a

of scanty fibrillar interstitial tissue, and of cells of various kinds, particularly of the small round type about the size of leucocytes, of epitheloid fusiform cells, and of the so called *leprosy cells* which Virchow first described These are large, round, or oval cells, with several nuclei and vacuoles which have already been mentioned (p 235) From these *giant* cells, with twelve or more nuclei at their periphery, may develop A great many of the cells contain the bacilli described above, some only a few, others, especially the leprosy cells, are literally crammed with them In the upper strata of the neoplasms—increasing in number according to the age of the latter—there are to be found besides, peculiar alluded to and it is to these that the According to the investigations of Schaffer and others, Langhans' giant

The leprous neoplasms are rich in vessels, in the vicinity of which there are agglomerations of cells These are generally grouped round the adventitia of the blood vessels (lymph spaces) In the skin the neoplasms advance towards the surface and infringe upon the epidermis from which, however, they are always separated by a free sub-epidermic zone, downwards they force their way deep into the subcutaneous adipose tissue The neighbouring tissues (hair follicles and glands) are and partially atrophied

years Their
d to external
vestigations of

Babes and others, occur in the nodules More frequently, however,

tions, differentiated, however, from the nodules, by far more scanty bacillar contents, by the lack of the large bacillary formations (leprosy cells, globi) and by a tendency to be transformed into connective tissue, thus inducing a decay of the bacilli and serving to explain the reason that bacilli are rarely found in old spots White spots may also result in trophic disturbances through affections of the nerves

Unna regards the maculæ as neurotic inflammations caused indirectly by the bacilli invading the nerves of the skin he differentiates them as *neurolepride*s from the *lepromata* which are caused by the presence of the bacilli in the skin itself.

In o ... of the nerves in which, and in ... and endo- neurium ... d mucous ... Virchow)

great bacilli containing formations are absent

disappear, and only connective tissue and fat are found The muscular atrophy is secondary and is caused by the disease of the nerve endings (Hansen)

The degenerative atrophy of the nerve fibres, which is a *consequence of*

anæsthetic and sensitive areas in the same nerve region, as well as of atrophic next to intact muscles, is explained by the fact that all nerve fibres in a nerve are not symmetrically destroyed, a part of the nerve remaining unaffected In contradistinction to other diseases of the peripheral nerves (polyneuritis, beri beri), the sensory fibres are, in leprosy, attacked in the first place, the motor disturbances are less than the sensory In the various trophic disturbances also that characterise the anæsthetic form of leprosy, the atrophy of the skin, the falling out of the hair, the changes in the nails, the appearance of vesicles, the formation of ulcers the mutilation of the limbs, &c, the explanation is afforded by the nature of the disease of the nerves and the impairment of the trophic fibres

Formerly leprosy was regarded as a primary disease of the *spinal cord* It is true that in a series of cases changes were found in the cord, such as hyperæmia (particularly on the posterior aspect), inflammation of the spinal meninges, granulomatous proliferations within the cord (as a continuation from the nerve sheaths with consecutive atrophy), sclerosis, extensive softening of the spinal cord, atrophy of the ganglion cells of the posterior cornu of the spinal cord and of Clarke's columns, degeneration of the lateral and posterior columns (particularly Goll's columns), atrophy of the posterior roots and fibrous degeneration of the spinal ganglia In many cases, however, the spinal cord was found to be quite normal, so that the above conditions were incidental merely The changes mentioned are partly to be attributed to secondary lesions, symptoms arising in consequence of the primary disease of the nerves and are partly attributable to direct injury caused by the invasion of bacilli, partly they are mere incidental complications exercising a variable influence on the symptomatology of the disease

The same *leproid neoplasms* that are formed in the skin, mucous membranes and nerves, also occur in the *cornea, cartilage, lymphatic glands and internal organs*

The *lymphatic glands* in leprosy exhibit a remarkably characteristic appearance

in high ... agreement amongst authors, ... ng that the microscopic differential diagnosis ... and tub... ts great difficulties.

It is generally agreed that lepromata may be present in the *liver spleen*, and *testicles*

[illegible]

[illegible]

neoplasms (see above) it is doubtful if in these cases it was a question of mixed infect on To decide this point it would be advisable to avail oneself of experiments on animals in which case negative results would exclude tuberculosis.

The *vascular system* is affected in the form of periarteritis and endarte ritis and phleb t s (phlebitis nodularis Gluck) which may probably lead to partial obliteration of the vessels

In the *bones* the following conditions may prevail osteomyelit s (agglomerat ons of leprous tissue in the bone marrow and in the cancel lous tissue) necrosis caries and processes of absorption which, com mencing at the periphery transform the bone into connective tissue (Miura)

In the an esthet c form the *joints* are described by Hansen and Looft as undergoing changes such as occur in tabes and other diseases of the spinal cord with trophic disturbances, there is thickening and villous proliferation of the synovial membrane, looseness of the capsule destruc tion of cartilage and subluxation Articular affections of a tubercular character are occasionally observed, especially at the tarsal and wrist articulations (Hansen and Looft)

DIAGNOSIS.

It is easy to recognise well marked cases of leprosy in countries where the disease is endemic On the other hand the diagnosis of undeveloped cases in countries free from leprosy may be difficult In doubtful cases it is important to discover if the person in question has been staying in leprous countries, or has had personal contact with lepers There is quite a number of cases in literature—those of Kobler, Beigel, Klemm, Meyer, Langhans, and others—which have been described as cases of spontaneous leprosy originating in regions free from the disease, but which were certainly not such There are no genuine, scientifically

opened for this purpose u
four days) According
quently succeeds in the ı
form Tschnernogabow
from the diseased skin by means of deeply inserted glass capillaries be used for examination Martin recommends that the serum which exudes when a nodule is squeezed with a pincette, such as is used for squeezing the vaccine pustules of calves be used for examination The material for demonstrating bacilli may be obtained by pricking nodules infiltrations, or nerves, or still better by excising a small piece of either, and pulveris

onfused with —
lower extremities and the
on and thickened maculæ

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eprosy
transform the face in a typical manner, the formation of ulcerations which in leprosy do not attain the dimensions and depth of those of syphilis, the presence of a skin eruption, which has a very different ... in the two diseases and the occurrence of anæsthesia, which

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situated round the hair follicles and are confined to the face, other disturbances are not present

Scleroderma —In scleroderma the skin is at first thickened and later on attenuated There are no nodules and blisters, and anæsthesia *is less*

marked than in leprosy Ulcerations certainly do occur, bu to mutilation of limbs Both diseases exhibit maculæ ar atrophy

Syringomyelia and *Morvan's disease* —The differentia between these two diseases and leprosy is particularly diffic

muscular atrophy attacks the small muscles of the hand

leprosy it is not confined to certain nervous regions, but in sy the anæsthesia is fairly strictly confined to the nerves that or the diseased parts of the spinal column Dissociation o occurs in both diseases In the leprous skin the secretic mostly ceases early, whereas in syringomyelia hyperidrosis a long time in those regions of the body that are attacked myelia, moreover, there are spastic symptoms in the lower paralysis of the bladder and rectum, nystagmus immobility c and dysphagia On the other hand, maculæ, nodules and infi absent, as are also thickening of the nerves, glandular swelli of the hairs of the eyebrows

The symptoms of Morvan's disease essentially consist of

PROGNOSIS.

The prognosis of leprosy is very unfavourable for, accor unanimous opinion of all thorough leprologists the disease a incurable All reports as to ...

reports as to cures of leprosy make no more impression credulity than similar miracles mentioned in the Bible

Removal from the pl...

PROPHYLAXIS.

As leprosy is incurable, the principal stress is laid on prevention of this horrible disease This is accomplished by *avoidance of any contact with lepers*, and this purpose is most successfully attained by *isolating* the sufferers from this disease Exper

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being reminiscent of the cruel mode of action practised during the middle ages The chief thing to do is to erect leper asylums and leper colonies of sufficient size and number in the countries where leprosy is endemic In these, as in every other good

ing space and plenty of clothing

occupation for the patients (agri

pations), their religious and other needs should be studied and a certain degree of freedom of action should be accorded to them, so that they feel they are well treated in such places, and go to them voluntarily Permission should also be accorded to the patients to bring their families, or at least the husband or wife, as the case may be, into the leper asylum It is better for the children to be entirely separated from their parents and brought up at the expense of the State or the community When this is not practicable they should at all events be provided with separate dormitories in the asylums [1] Isolated islands are particularly adapted for the establishment of leper colonies

By a shelter such as this the lepers themselves are benefited, the improvement of the hygienic conditions always has a favourable influence on the course of disease of lepers who mostly live in dirt misery, and want In consequence of regular, moderate occupation and suitable and sufficient nourishment their general condition of health improves The ulcerations present heal relatively quickly by means of simple outward applications, and mutilations, which in most cases result from neglect, are prevented

As to the isolation of the lepers, it depends upon the social and political conditions of any given country as to whether it be made *obligatory* or *voluntary* Isolation is urgently necessary in patients with nodular leprosy, particularly in the case of those afflicted with ulcerations According to Sticker s investigations, also, the sufferers from the anæsthetic form are by no means so free from conveying danger as Impey asserts, and in their own interests as well as in the interests of the community, they should be sheltered in leper asylums

[1] The Matoonga Leper Asylum near Bombay is a pattern asylum on a large scale besides the sick wards there are shops belonging to it a hospital a pharmacy a school, a Hindoo temple a Mohammedan mosque and a Roman Catholic church

* The voluntary segregation of lepers according to the Norwegian pattern was recommended to all nations, with self government and a sufficient number of doctors, at the Leprosy Conference in Berlin

The non isolated lepers as well as all suspicious persons—that is to say, all who have come into close contact with lepers or have lived with them a long time—must be subjected to continual sanitary police supervision, for which purpose it is, above all, necessary to *register lepers* and

should be prevented from keeping shops, or carrying on the occupations of barber or laundry man in fact they should be excluded from any calling relating to clothing and food and also from prostitution

The ulcers of the sufferers, from which quantities of bacilli are discharged, must be covered with *protective dressings*, and old dressings should be burned Particular attention should be paid to the *nasal* and *pharyngeal secretions* and also to the *expectoration*, which should be suitably disinfected

The clothing, bed and bedding of lepers must be disinfected, and should in no case be used by other persons Their *dwellings*, likewise, must be disinfected

In non leprous countries the sanitary police should keep under supervision *lepers who have arrived from abroad*, this at the present day being no rarity on account of the commercial intercourse, more especially in the principal commercial centres Such persons should not be lost sight of, and should be prevented from mixing unnoticed amongst the population and kindling centres of infection Soldiers, sailors and colonial officials coming from leprous countries should be subjected to examination

Particular attention should be directed to the *wholesale emigration from leprous countries*, such as takes place from over populated India and China to countries in which labour is required Chinese coolies undoubtedly conduce enormously to the spread of leprosy, especially around the coasts and islands of the Pacific Ocean Control should be exercised not only at embarkation, but above all, over ports of disembarkation, and the lepers should be examined by the Consular authorities of that country to which the emigrant is bound

TREATMENT

clear parts anterior to the nodules should be incised (to check thei

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Looft, is to be performed at the outer and inner canthus, will be found o service. At the outer canthus the usual process is adopted, but at th inner canthus the margins of the eyelids internal to the puncta lachry malia are laid bare by very superficial incisions and then the bared edge are united by two sutures When the lid has only dropped a little the operation at the inner canthus alone suffices. Should the power of vision be lost and severe supra orbital neuralgia still persist, the eyeball mus be enucleated

In disease of the *larynx* tracheotomy may become necessary whe

nerves, which ar

e galvanic current

also permissible n

such cases to try the anti neuralgic drugs, such as antipyrin, antifebrin phenacetin, &c Balz effected the relief of neuralgia in one case b opening the nerve sheath and injecting 5 per cent carbolic acid betwee it and the nerve substance

In *attacks of fever* that did not yield to the usual remedies, Mulle

or hot baths (lepers feel a great want of warmth) and also salt water alkaline, or sulphur baths decidedly exercise a favourable influence o the condition of the patients

[1] *Verh. de xu. Kongr für innere Med.* Wiesbaden 1891, p. 410.

The patients then betake themselves to an alkaline bath in the vicinity, that has the property, according to universal report, of alleviating the pains very quickly In this stage the patient's skin has a scaly appear-

nergetic and difficult
ble that the general
ve excellent appetites,
hing is so severe as

often to deprive them of sleep

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XI

FRAMBŒSIA TROPICA—YAWS.

DEFINITION.

Frambœsia tropica occurs endemically in the tropics, and is a contagious, chronic, infectious disease characterised by the appearance of raspberry like papules on the skin It bears some resemblance to syphilis

NAMES.

tropicum

HISTORY.

The first notification of the disease came to Europe at the commencement of the sixteenth century (1525), through Oviedo, who became acquainted with it in St Domingo, and who referred to it under the ... (1648) from

known

ie Arabian doctors

he names *Safat* or *Sahafat* relates to frambœsia as is asserted by some, more probably the disease referred to was syphilis (Hirsch)

[1] According to Nicholls the name *yaws* is derived from the Celtic word *yas* which means to 'well up

GEOGRAPHICAL DISTRIBUTION.

Frambœsia only occurs in tropical countries

The tropical regions of Africa form its principal seat, and it occurs on the West Coast from Senegambia to Angola (it was not observed in Cameroon by F and A Plehn), in the district of West Soudan (Timbuctoo, Bornu), Algiers, the bed of the Nile, Mozambique and the African Islands the Comores, Madagascar and Mauritius, where, however, Prout found no typical cases of the disease, but only crab yaws (see below) Lately Griffiths has observed yaws in South Africa (Kimberley), Kafirs being affected by it there

In Asia, the following places belong to the geographical region of distribution of frambœsia the Malabar Coast the Coromandel Coast [illegible]

Samoa, and on Jaluit (Marshall Islands)

The islanders of Fiji have almost all yaws in their childhood. They have the belief that a child, in order to grow up healthy must have this disease They therefore inoculate those children with yaws that do not get it naturally

In America, where it was probably carried by the negro slaves, yaws is known in the Antilles, and in Brazil, Venezuela, Guiana and Costa Rica

ETIOLOGY.

Yaws is infectious, and the contagion is contained in the secretion and blood of the papules of the patients, as confirmed by inoculatory experiments on persons Inoculation "takes on healthy persons, and also on yaws patients, whose illness is not influenced thereby

[illegible]

Natural transmission takes place by means of injuries of the epidermis, [illegible]

dirty, infected huts, &c

The degree of contagion of the disease does not seem to be the same in different countries It is reported that it is so contagious on the Fiji Islands that Europeans acquire the disease by passing the night in the houses of natives (Skottowe)

The *period of incubation* is differently given by different authors, it appears, from the accounts furnished, to fluctuate between two weeks and *two months* *After inoculations* the period of incubation is between twelve and twenty days and is therefore shorter than when the disease is naturally acquired

Once the disease has been got over, protection is afforded for a long period, or for ever

There seems to be no heredity, and children are never born with the disease

Hallen observed an infant with yaws twenty days after birth He was born with an eruption resembling prickly heat on the fourth finger of the left hand and on the back from which the papules developed The mother suffered from yaws Hallen is of opinion that the child was infected at the time of birth or subsequently

No *age* is spared by the disease, the age of childhood is, however, principally affected A few observers saw the disease in children exclusively

Both *sexes* are affected without distinction

Black and *coloured* persons are more frequently attacked than white persons and those of mixed races, a circumstance that is attributable to the fact that the whites bestow more care on their skins, and as they live under more favourable hygienic conditions the possibility of infection is less than is the case with the black and coloured races Hirsch, however, does not consider this reason suffices for the explanation of the exemption of the white races, and he instances an observation of Ferrier, who knew several white persons who did not acquire the disease in spite of the intimate connection they had with sick negresses and mulatto women This observation is in direct opposition to the fact respecting the Fiji Islands mentioned above

The influence which, according to Keelan s observations, *vaccination* exercises on yaws is interesting If vaccinated persons are taken ill with yaws the disease has a very mild course Vaccinations made on persons suffering from yaws have no local results, but exercise a favourable influence on the course of the disease

A form of yaws also occurs in *fowls*, in which Pierez discovered a micrococcus *similar to that in human yaws* It is however, questionable if the two complaints are identical Hirsch states that he several times caused typical yaws in fowls by inoculating them with the secretion of yaws papules

SYMPTOMATOLOGY.

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ay sleep,
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lighter

in colour

following further symptoms may set in: nausea and vomiting, giddiness, tinnitus aurium, flickering of objects before the eyes, photophobia, [illegible] heart and [illegible] is loss of [illegible] onstipated [illegible] diarrhœa sets in, at first of a fæcal character, but later the evacuations are serous, and sometimes sero sangui[illegible] sensitive to pressure, the [illegible] enlarged The liver may [illegible] size of the spleen is a le[illegible] scanty, depositing a sediment, albumen is occasionally present

One of the characteristics of verruga is that it induces marked anæmia The higher the fever the more pronounced is the anæmia The number of red corpuscles may be diminished to one and a half millions in the cb mm, or less, the skin becomes livid and sub icteric, the mucous membranes assume a waxy appearance Anæmic sounds can be heard over the heart and cervical vessels, there is frequently œdema especially over the joints

The prostration of the patients increases under the aggravation of the symptoms and restlessness and slight delirium may set in After this condition has persisted for some time—on an average from twenty five to thirty days (Odriozola)—a gradual improvement of all symptoms takes place The temperature becomes normal, or only slight irregular evening fever persists This can go on for a month or longer, till the eruption appears and the disease enters its *second stage* Sometimes it happens that the eruption immediately follows the invasion, with an improvement in the general condition of the patients or it may be that before the outbreak of the exanthem all the symptoms become still more pronounced and only after the eruption has broken out does any improvement take place

In yet another group of cases no eruption at all sets in, and after a general change for the worse death results, accompanied either by high [illegible]

Oroya fever on account of its having come under observation amongst the labourers and engineers engaged in the construction of the Oroya line Odriozola gives it the name of *Fièvre grave de Carrion*

The symptoms of the stage of invasion are not in all cases so pronounced as have been described above It is not uncommon for the only symptoms to be general languor and weakness, indisposition, great apathy, slight headache and low fever

Odriozola states that the average duration of the first stage of the disease is between three and four months

The *second stage* starts with the outbreak of the *exanthem*, the pathognomonic symptom of the illness As already mentioned, death often occurs prior to the appearance of the eruption, on the other hand it seldom happens that the disease runs its course without an eruption The eruption commences with small slightly raised pinkish red spots, which are soon transformed into dark red, or dusky bluish papules, which in their turn become wart like excrescences Sometimes small shiny

blebs, similar to sudamina, in other cases larger blisters and pustules, or

surfaces and the vicinity of the joints are affected to the greatest extent The palms of the hands, the soles of the feet and the hairy part of the head may become the seat of the eruption, while the trunk is hardly ever attacked Often the growths appear symmetrically, and sometimes injuries favour their outbreak on those parts of the body thus affected

The *number* of excrescences differs considerably, sometimes there are only a few of larger or smaller dimensions, sometimes a large number, and they may become confluent to such an extent that almost the entire skin is covered

Their size is quite as variable, at times they are so small that they might be mistaken for sudamina, in other cases they may attain the size of a small apple The small excrescences are situated in the superficial layers of the skin the larger ones in the deep layers and in the sub cutaneous cellular tissues, the latter are therefore at first only perceptible to the touch, and the skin over them is unchanged.

Odriozola distinguished two forms according to the size of the excrescences, the *forme miliaire* (from the size of a pin head to a pea) and the *forme mulaire* (larger), nevertheless these forms are not specifically different from each other

As to their *form* they may be cylindrical, conical, globular, semi globular, fungiform, or of irregular shape, when several excrescences are confluent they are generally of an irregular form Moreover they may either have a broad base or be pedunculated

Sometimes the places on which the eruption breaks out are œdematous, and this is especially the case when the eruption is severe, this is most

size their surface appears
, being hard, soft or fluc
y easily bleed They then
dots or eschars on their

apices These hæmorrhages, which, if considerable, still further conduce to make the anæmic patients still more bloodless, occur more frequently at high altitudes in consequence of the rarefication of the atmosphere, than in the more low lying places, the course of the disease on the whole is more rapid in high than in lower altitudes

Not only is the skin the seat of these new growths, but the eruptions extend to the mucous membranes and internal organs There exists no mucous membrane or organ in which they may not appear, and the symptoms they can originate are remarkably manifold. Thus excrescences in the nose may cause epistaxis, in the throat and œsophagus, dys phagia, if situated in the larynx, cough, hoarseness, hæmoptysis, and even suffocation may result, if they have their seat in the lungs hæmop tysis and infiltration may set in, which may be mistaken for tuberculosis when situated in the stomach they cause hæmatemesis, in the intestine, diarrhœa and intestinal hæmorrhage, in the kidneys or bladder, hæma turia, and in the uterus, metrorrhagia In rare cases the brain and spinal column participate in the disease, inducing epileptiform convulsions and symptoms of meningitis The diagnosis of "inward" verruga, when the eruption is not simultaneously present on the skin, is sometimes extraordinarily difficult

may even become so severe that death ensues Profuse sweats are an important symptom exhibited by patients during the entire course of

general symptoms improve and convalescence sets in

The eruptions disappear in various ways by (1) *simple involution*, (2)

cov

but

sof

then present the appearance of spongy protuberances that bleed easily, and exude a sanguineous, purulent fœtid fluid they are of a red, grey, or blackish colour, resembling ichorous, malignant masses If the secretion dries up they become covered with brownish scabs, and finally they heal by cicatrisation

Suppuration of the excrescences is seldom observed

The duration of *verruga peruviana* varies considerably Carrion died on the sixteenth day of disease Generally, however, the disease extends

Death may be caused by the severity of the infection, exhaustion, or septicæmia

PATHOLOGICAL ANATOMY.

The bodies of persons who have died of verruga peruviana exhibit

the *lungs*,

(ulcerated verrugas)

All the *lymphatic glands* appear swollen, the mesenteric glands more especially so

The *bone marrow* is hyperæmic and of a spongy consistence

Verruga excrescences are naturally the most important condition and these are met with not only *on the skin* but are largely distributed in the *interior of the body* According to Odriozola they have been found on the mucous membranes of the eyes nose mouth throat œsophagus, stomach intestine larynx trachea and bladder on the serous membranes the endocardium in the cerebral and spinal meninges and the choroid plexuses in [illegible]
muscles periosteum a[illegible]
organs and tissues a[illegible]
thyroid gland the cel[illegible]
of the vertebral canal the adventitia of the blood vessels the articular and peri art[illegible]
the size of [illegible]
the miliary [illegible]

As to th[illegible] mostly consist of cells of various kinds mono and poly nuclear leucocytes and swollen connective tissue cells which are kept together by an exceedingly delicate fibrous stroma They contain numerous vessels the walls of which are infiltrated with leucocytes and in larger growths *the centre is cavernous Probably the rarificat on of the* atmosphere in high altitudes exercises some influence on the existence of this cavernous tissue The fat cells of the subcutaneous cellular tissue as well as the sebaceous glands hair follicles and sweat glands are completely included in the infiltration In non ulcerated growths Letulle found [illegible]
pap llæ obliter[illegible]
where it was [illegible]
the cells of t[illegible]
appeared betw[illegible]
had disappear[illegible]
surface there were agglomerations of pus

The miliary papules of the *internal* organs examined by Nicolle consisted of ep theloid cells surrounded by embryonal cells and in some parts exhibited caseation and giant cells Letulle on the other hand found neither caseous areas nor giant cells in the papules of the sk n It is therefore by *no means beyond the bounds of possibility that*—taken in conjunction with the presence of bacilli mentioned above—the case from which the preparations examined by Nicolle originated was not a case of verruga but of tuberculosis

DIAGNOSIS

In the stage of invasion the diagnosis of the verruga disease is often [illegible]

distribution of

To a superficial observer it might appear that the two diseases are different, but on more minutely considering the subject it will be fo… that the differences are only a question of degree, with the exception t… hitherto no internal manifestations have been observed in yaws, and t… verruga may be present at birth I am therefore inclined to the opin… that the two diseases are nearly related, verruga being nothing more th… *a se ere form of frambœsia or yaws, modified partly by the high altitude … the regions where it occurs and partly by being complicated with malaria*

PROGNOSIS.

The prognosis of verruga particularly as regards whites is always serious The following symptoms, according to Odriozola, may be regarded as *favourable* The general appearance of the eruption, immediately after the usual symptoms of invasion also when the excrescences develop to a certain degree and then slowly subside, while the general improvement takes place quickly The prognosis, on the other hand, is *unfavourable* when the eruption be it partial or general, pales quickly and disappears without the general condition improving.

TREATMENT

The first line of treatment is to *remove the patients from the verruga infected district* and when possible, to bring them to the coast In other respects the treatment is *symptomatic*, and is principally directed to the fever, pains and anæmia On account of frequent complication with malaria, Odriozola recommends that quinine be tried in every case

The *local* treatment is the same as in yaws Odriozola advises that all ulcerated protuberances should be extirpated or removed by ligature

The natives attribute a specific effect to a decoction of maize and a decoction of *Bulnesia cordata*, both of which possess diaphoretic qualities

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XIII

THE PONOS OF SPETZA AND HYDRA.

DEFINITION

mentioned islands is comparatively rare formerly the disease was of much greater frequency

SYMPTOMATOLOGY

The disease begins acutely with fever, which is also maintained during the course of the disease The children become languid sad and

instances enlargement of the cervical glands has been observed The fever exhibits an intermittent or irregular type The condition rapidly becomes worse, the children become more and more emaciated and bronchitis frequently sets in Broncho-pneumonia peritonitis and

Recovery is but seldom observed The duration of the disease generally averages one to two years, sometimes, however, it does not exceed two or three months

PATHOLOGICAL ANATOMY.

Hitherto we know but very little of the pathological anatomy of the disease, as we have only the report of one *post mortem* examination made by Stephanos

In this case the spleen was enlarged, but not much pigmented, the trabeculæ and stroma were considerably thickened, and the capsule very firm In the right lung an abscess was found reaching to the pleura The liver exhibited initial cirrhosis (alcoholic drinks had been given to the child in the course of the disease) The kidneys were hyperæmic, and isolated bronchial and mesenteric glands were swollen

ETIOLOGY.

The etiology of ponos is quite obscure. Climate, season, or condition of the soil are supposed to exercise no influence in the genesis of the disease Food and social condition play no part in its origin. Rich and poor are equally attacked It occurs in healthy houses as well as in the hovels of the p [illegible] attacked by the disease, whic [illegible] being cut Children of 4 [illegible] The male *sex* is attacked somewhat more *frequently than the female.*

The disease is mostly confined to families with a tubercular history, and in these it is not rare for several children to be seized

Further researches are urgently required, and should be directed to find out if malaria parasites are present and to confirm whether ponos is a specific infectious disease or *only a phase of malaria*, which, as is well known, has a predilection to attack very young children.

TREATMENT.

Treatment consists in giving the sufferers *suitable* food (in the case of sucklings a good wet nurse should be obtained), and tonics (quinine, iron iodide of iron) should be administered One cannot, however, build great hopes on the results of these measures

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II.—DISEASES CAUSED BY INTOXICATION.

I

PELLAGRA.

DEFINITION.

Pellagra (from pelle agra, *i e*, rough skin) is an exceedingly chronic disease, attributed to eating spoiled maize, and of the nature of an intoxication. It runs its course in attacks which are manifested by gastric and intestinal phenomena, nervous and psychical disturbances, and by the *appearance of an erythematous exanthem* In its further course this disease mostly leads to general cachexia and to a fatal termination.

SYNONYMS.

[illegible] insolato di prima- [illegible] o, Mal de Asturias [illegible] .ma maisitica, Lepra italica, Scorbutus alpinus.

HISTORY.

The history of pellagra cannot be traced back further than to the first half of the [illegible] Europe.

GEOGRAPHICAL DISTRIBUTION.

Pellagra prevails endemically in Europe, Africa and America. [illegible] Guadalajara are the principal seats of the disease.

In France it prevails principally in the Departments Gironde and Landes, smaller centres are found in the Hautes et Basses Pyrénées, Haute Garonne and Aude

In Italy, Lombardy, Venice and Emilia are the principal centres The provinces of Brescia, Padua, Ferrara and Piacenza are most severely affected, over 5 per cent of the rural population suffering from pellagra

According to the official statistics published by the Minister of Agriculture, the number of persons suffering from pellagra in Italy in 1881 was 104,607 = 0 36 per cent of the total population, of these 55,881 = 2 per cent of the total population belonged to Venice and 36,630 = 1 per cent of the total population to Lombardy About 10 per cent of the persons afflicted with pellagra are mentally disordered In the Italian lunatic asylums there is an average of 10 sufferers from pellagra to every 100 patients, in Venice 35, and in Lombardy 15 Between 3 000 and 4,000 perso

In *Africa*, Egypt more ... and Algiers, belong to the region ... ica Mexico is its chief site, yet her ... ase is relatively rarely observed, and is principally confined to the southern provinces, Yucatan and Campeche (Vales)

ETIOLOGY

Pellagra is a *disease of intoxication*, attributable to the continued

Mexico, Western Asia and India, the grain ripens and dries more easily in consequence of the more tropical climate, and therefore

also appears to

ease is already body after the *union is that it* io has rendered intoxication is ie maize due to cceeded in pre

paring a watery extract, an alcoholic extract and a red oil by means of which pellagra like symptoms could be originated in animals as well as in human beings He conjectures that two toxins are contained in

have been confirmed in the works of Husemann and Cortes Pellizzi

come to on the ground of their experiments Neusser is of opinion that the toxin does not exis pre formed in the maize but only develops in the intestines when the digest on is disordered from a non toxic substance which is digested and excreted when the digestive organs are healthy Belmondo is likewise of opinion that the toxin is only originated in the body through the agency of micro organisms which have been introduced into the system with the spoiled maize

Various *fungi* fo nd on ma ze to wh] so e observers were n l ned to attr bu e an et olog cal s gn ficat on have p o d to be harmless at least n regard to pellag a

w tl pellagra it be ng n these merely a qu st on of complex symptoms s m lar to pell gra l t of undoubtedly d fferent or gin (partly tl e re ult of c n e alcoholi n Husemann points out that poss bly otl er sub tances the const tue ts of wh c i ar s n ar to those of ma ze may originate tox ns w h a alogou effects un l r the influ nce of spontaneous decomposition Exa np es of su h a e fam l ar in the case of salt d an l sm k d fl in wl cl is d veloped a tox n analog to sausage po s or which in otl er cases are capable of or ginat ng c o a s mptoms due to a tox n analogous to a cheese po son and yet n othe ca s cause u t aria and d verse skin erupt ons

Lons Sanz a report of the endem c occurrence of pellagra n the pro ince of Bada oz (Spa n) the inhal tants of wl icl eat no *ma ze* requ res explanat on

The mal an l female *sexes* are al nost eq ally attacked by the d sease During pregnancy an l after partur t on pellagra ay develop

No *age* is spared but sucklings are exceed ngly rarely s ized Persons aged between 40 and 60 years are most freq iently attacked

The *indivi l al predisposit on* is d fferent Althou h an ent re fam ly s are attacked by pellagra alcol ol sm enfeeblemen a e Pellagra has with

Winternitz goes so far as to deny the exi tence of pellagra as a specific d sease peculiar to a l nited area What s described as pe lagra s in his judgm nt on y the cond t ons of disease induced by want and m sery

Heredity also plays a part in the etiology of tl e d sease as the acquired predisposit on of the nervo is system to contract pellagra can be trans mitted to poster ty Loml roso is even of op n on that the d sease i self is hered tary espec ally from the gran lparents

SYMPTOMATOLOGY

The symptoms of pellagra are so extraordinarily manifold that as Lombroso expresses himself "in no pathological condition can one say with more justice than in this that there are no diseases but only patients" There are even differences in the symptoms in different regions, some phenomena which predominate in certain localities being absent in others This phenomenon may be possibly due to the different condition of the maize or the diet or to climatic or racial factors

Pellagra has a course distinguished by pronounced *attacks* alternating with periodical ameliorations and exacerbations The exacerbations occur regularly in the *spring* During the first attack stomachic and intestinal symptoms with nervous disorders set in accompanied mostly by an exanthem In the following attacks the disorders of the nervous

The *first stage* is apt to be preceded by prodromal symptoms for a longer or shorter period According to Geber the patients for several previous winters feel languid without cause they have no inclination for bodily or mental work and often complain of flying pains in the head spine or other parts of the body With the advance of the spring these

Thus it may

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of appetite

disgust for food, particularly of maize gruel more rarely bulimia moreover there is unquenchable thirst or an antipathy to drink heartburn eructation abdominal

course of the disease

region of the stoma

mostly present and

more rarely there is constipation In a few cases Sandwith observed enlargement of both parotids without attendant pain

These digestive disturbances are accompanied by *nervous disorders* headaches generally located in the occiput giddiness and pressure in the head vert ... pains in the neck and ... rtainty of movement ... ttack the tendon reflexes are considerably ... is usually sexual hypererethism heightened psychical excitability low spiritedness weak memory a difficulty in thinking disinclination and disability for bodily and mental exertion and not rarely a certain degree of mental obtuseness

Simultaneously with these symptoms though not constantly, an erythema appears It particularly affects the backs of the hands the lower third of the forearms occasionally also the dorsum of the feet it also appears on the face neck and upper part of the chest—in fact on those places that are uncovered and exposed to sunlight In the case of persons who whilst labouring go almost naked such as the fellahs in Egypt the greater part of the body is affected The skin becomes red and swollen, causing the patient to experience a sensation of tension,

itching or burning Sometimes little blebs and pustules that dry up to scabs or eczema develops After the erythema has subsisted for a few weeks a desquamation of the epidermis in large patches takes place

After three or four months therefore in July or August the condition of the patients gradually becomes ameliorated the skin, however, for a

gradually passes into the *second stage* which is characterised by the *serious cerebro spinal symptoms* here enumerated

1 *Motor Disturbances* —There is usually a more or less considerable *muscular weakness*, particularly in the lower extremities Occasionally there are partial *paralyses* and in severe cases one sided ptosis of the upper eyelid is observed on the other hand, according to Tuczek ataxia does not occur

The following motor *symptoms of irritation* are observed muscular tension and tonic contractions of the upper and lower extremities, which may increase to tetanic rigidity sometimes also there is tremor of the arms the head and the tongue likewise cramps convulsive jerks, and uncontrollable movements of single limbs exceptionally also there are pronounced epileptiform fits with loss of consciousness

The gait is either simply paralytic or paralytic spastic When as happens in some cases partial muscular atrophy sets in the aspect of the disease is that of myatrophic lateral sclerosis paralysis contraction and atrophy of certain groups of muscles

The *electrical excitability* of the muscles does not in every case exhibit changes Lombroso often found that the flexors of the forearms were excited more easily than the extensors

The mechanical excitability of the muscles is frequently increased, and idio muscular contractions and fibrillary muscular twitchings also occur on mechanical stimulation

(3) *Disturbances of Sensibility* —The sensibility of the skin is unequal The sense of touch remains intact and also the sense of temperature whilst much more frequently the sense of pain particularly in respect to the legs is diminished The *muscular sense* is normal

Paræsthesia is seen very frequently and in great diversity The sensation of itching and burning on the trunk and extremities is the most frequent and becomes so intolerable that it drives some patients to commit suicide There is moreover the sensation of formication subjective sensations of temperature (a feeling of flying heat cold, or numbness) burning of the eyes dragging in the neck sensation of suffocation a feeling of constriction about the chest a feeling as of a band round the body a sensation of weight in the region of the groins and uterus and of falling of the womb a sensation of cold or of irritation or contraction of the penis and of heaviness in the testicles

Besides the above mentioned there may be experienced pains in the head neck and back and neuralgia especially intercostal Sandwith found sensitiveness to lateral pressure in the dorsal and lumbar vertebræ to exist to diverse extent more particularly in the median dorsal region

In regard to the *reflex* activity of pellagra patients the skin reflexes are usually normal The tendon reflexes are mostly increased frequently to a considerable extent particularly the knee jerk very rarely however the patellar tendon reflexes are either weakened or quite absent.

(3) *Disorders of the Organs of Sense*—Occasionally *weakness of vision, hemeralopia, diplopia, muscæ volitantes* and *photophobia*, are observed The pupils, as a rule react somewhat indolently There is frequently dilatation, more rarely contraction of one or both pupils *Ophthalmoscopically*, according to Lombroso, the conditions most frequently found are opacity of the retina and atrophy of the arterial vessels of the retina, more rarely atrophy of the optic nerve with or without retino choroiditis is found Sometimes premature opacity of the lens sets in Lombroso also observed blepharitis and pterygium

The sense of taste is in some cases perverted everything tasting "salty' to the patient This is occasionally so predominant a symptom that the disease is named after it Thus the people of Lombardy designate the disease *salso* while in Spain it is known as *flema salada*

(4) *Vasomotor and Trophic Disorders*—A general *state of contraction of the cutaneous vessels* has to be primarily mentioned, pallor of the skin subjective and objective sensation of cold, and occasionally also goose skin During the later stages of the disease *neuroparalytic* dilatation of the capillaries and veins sets in and also œdema The face, more particularly the nose of the patient, is sometimes reddened, resembling the aspect of an alcoholic indeed, complication with alcoholism is no great rarity

The *skin eruptions* mentioned above must here be considered Though doubtless the rays of the sun influence the eruption (on those parts of the fingers on which rings are worn the skin remains intact) [Scheiber] yet the solar influence only cannot be made answerable for it

According to Bouchard the ep dermis in pellagra has lost its fluorescence In consequence the skin is deprived of protection from the chemical sun rays, which —particularly the violet ones—tend to develop the eruption

After repeated attacks the skin becomes of a brown hue and appears smooth, dry and thin it also loses its elasticity, so that it may be lifted up in folds which remain in position White streaks resembling pregnancy lines may be present in the skin, whilst in other cases the skin appears *to be infiltrated fissured, and of a livid colour*

There are frequently disorders of nutrition of the *nails* The nails are very rarely found normal in pellagra patients, being mostly clubbed ridged grooved split very thin, necrotic, or overgrown with skin

The *tongue* frequently exhibits deep indentations and is deprived of its epithelium

[illegible] presence of anguish and ... ek self destruction ... ming, *stupor* is a ... nd this is accom ... s is generally very ... sness is disturbed, sometimes to such an extent as to evoke delirium of a melancholic type The melancholia at first, is apt to appear *periodically* and it is often only after the patients have had a yearly recurrence of the kind for a long period that insanity becomes *permanent*

The mental disorder of the patients sometimes assumes the character

of *mania* but this is less seldom the case than is the melancholic type In some cases also mania and melancholia alternate with each other

Uncontrollable ideas ('I am drawn into the water) occur in pellagrous patients—forced movements forced positions cataleptic symptoms and hallucinations which may become manifest by delirium According to Tuczek however pronounced paranoia does not appear

If during the later stages of the disease the patients become imbecile they remind one of sufferers from dementia paralytica only the peculiar disturbances of speech and paralyses of the cerebral nerves are lacking though veritable dementia paralytica also may occur in pellagra

As to the remaining symptoms presented by the patients the following are to be mentioned

Increase of temperature may occur at the beginning or at some period in the course of the disease the fever is however usually slight and very transient (Alpago Novello)

The *pulse* is frequently accelerated or it may be retarded

The *gums* often exhibit a scorbutic diathesis

The *gastric juice* according to the investigations of Agostini contains little or no free hydrochloric acid

The quantity of *urine* is diminished its specific gravity mostly decreased its reaction often alkaline Lombroso and Roncoroni found the excretion of urea chlorides and particularly of phosphoric acid diminished Albuminuria is seldom observed in Italy whereas Dalla Rosa observed it in nearly half his cases in South Tyrol

Brugnola states that he found *tyrosin* crystals in the urine

Pellagra patients moreover markedly exhibit the signs of premature senility, such as premature greyness of the hair baldness wrinkles and lines on the face loss of teeth arcus senilis atheroma &c (Alpago Novello)

Should the disease break out in early childhood there is *retardation of development* of the entire body more particularly of the genitals

In consequence of the disorders of digestion the nourishment of the patient suffers in a high degree Anæmia and emaciation become more and more marked and the *third stage of disease*—the cachectic stage—is attained

The marasmus persists and increases The patients become permanently bedridden bed sores paralysis of the bladder uncontrollable diarrhœa profuse malodorous sweats weakness of the heart and dropsy set in and the patients finally die of general exhaustion or are carried off

[illegible]

lessness delirium and fever set in The whole muscular system is in a condition either of rigidity or intense tonic contraction The head is

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increase i reflex excitability the tendon reflexes in particular are always increased

The fever, which as a rule accompanies the typhoid condition, is very variable The temperature, according to Belmondo, mostly *fluctuates* between 38 5° and 40 0°, and during the last days of life may rise still higher or, on the contrary, may sink far below normal

Finally, fæces and urine are evacuated involuntarily, the tongue becomes dry and fissured, and sordes form on the teeth The typhoid state may last a week or two, when death not infrequently results from lobular pneumonia

Besides the fully developed forms of pellagra, *abortive* cases occur Thus Scheiber observed cases in which the pellagrous eruption was the sole [illegible]

years or even less Recovery can only be hoped for in the first stage of the disease, when the patient has only had one or a few attacks and is then permanently removed from exposure to the determining cause of the disease

[illegible]

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frequently observed to be the case in the Spanish provinces of Asturia and Galicia

PATHOLOGICAL ANATOMY.

The anatomical changes found in pellagra cadavers are manifold These, however, are not wholly due to the disease itself, but to the general cachexia and the senile decay which it induces

The cadavers, as a rule, are exceedingly emaciated, the panniculus adiposus and muscles wasted Lombroso also sometimes observed brittleness of the ribs, though the condition of all other flat and long bones was normal

The *heart* frequently exhibits brown atrophy, and more rarely fatty [illegible]

met with

The *liver* is frequently enlarged and undergoing fatty degeneration, sometimes brown atrophy is found

The *spleen*, as a rule, is small and atrophic

The *kidneys* frequently exhibit cirrhotic atrophy or fatty degeneration

The wall of the *intestine* is thin in consequence of muscular atrophy, the mucous membranes of the rectum and colon hyperæmic and covered with ulcers

The changes in the *nervous system* are the most important

Hyperæmia, anæmia, and œdema are the conditions most frequently met with in the *brain* and *spinal column* and their *meninges*, chronic

inflammation of the meninges and sub arachnoid hæmorrhages, changes which likewise occur in other chronic affections of the central nervous system, are met with. Sometimes, also, atrophy of the cerebrum, and especially of its cortical substance, is observed.

In regard to the *spinal cord* itself, Tuczek always found it diseased (in eight carefully examined cases). In all cases the *posterior columns* were the seat of symmetrical sclerosis, which extended more or less over the spinal cord, and especially involved Goll's columns. Besides these changes, in six cases there was symmetrical disease of a like nature in

The posterior roots were intact. In one case Tuczek observed besides

lateral columns.

Vassale, by means of a particular method of staining, proved that the primary degeneration of the nerve fibres is not of a morphological but of a histo-chemical nature, the diseased fibres assuming a different stain to the healthy parts at a time that they still possessed their normal size and form.

lathyrism (Tuczek).

P. Marie is of opinion that primarily there is disease of the cells of the lateral and posterior columns situated in the grey substance.

In the typhoid stage of pellagra Belmondo found acute myelitis

prevented by the kidneys.

Marchi (according to Tuczek) in two cases of typhus pellagrosus found *micrococci* in the blood of the living as well as in the different organs after death. Marchi, however, was unable to obtain cultures of these micrococci.

In regard to the *peripheral nerves*, Dejerine found the cutaneous nerves of the back of the hand degenerated. Raymond could not confirm this observation, and Tuczek, likewise, found the peripheral nerves normal. He even found no changes in the spinal and sympathetic ganglia with the exception of the above mentioned agglomeration of pigment.

DIAGNOSIS

The diagnosis of pellagra presents no difficulty in pronounced cases. Nevertheless the features of the disease are sometimes not so well marked but that the correctness of the diagnosis may be doubted. The statements

of the patients must be taken into account as to the course of the disease and the periodicity of the symptoms

The exanthem is moreover of great diagnostic value, but as we have seen, this symptom is not always present

Typhus pellagrosus may give rise to confusion with acute infectious diseases uræmia, and diabetic coma The differential diagnosis consists particularly in the non typical course of fever, the negative condition of the organs and urine, and the absence of an acute eruption

PROGNOSIS

The prognosis of pellagra is generally unfavourable More minute information, however, is given in the symptomatology

PROPHYLAXIS.

In order to prevent the disease, care should be taken that *unsound*

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TREATMENT.

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baths and internal administration Agostini advises that the stomach be

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II

LATHYRISM.

Lathyrism (Lathyrisme médullaire spasmodique), so called on the suggestion of Cantani, is a disease with a spastic spinal paralytic course and which is attributable to poisoning with various kinds of the family of the Papilionaceæ lathyrus (chick pea or common pulse)

HISTORY.

The disease was probably known to the ancients—at least it may be inferred from the fact that according to Huber in the Hippocratic writings on epidemics this disease is referred to as follows "At Ainos those men and women who continually fed on pulse

In India the lathyrus is called *kesari* or *teori* in Algiers *djilben*, and lathyrism *meurd djilben* i e the chick pea disease

GEOGRAPHICAL DISTRIBUTION.

The disease hitherto has been observed in several departments of *central* and *south France*, in *Italy*, *Algiers* and *British India*

ETIOLOGY.

Lathyrism is a *disease of the nature of an intoxication*, which may be originated by eating *various kinds of lathyrus* Of these the *lathyrus*

beings, a flour made from the grain being mixed with corn meal, and bread prepared therefrom

The
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years
several
further investigation is required By the administration of preparations

of lathyrus kept for sale in the bazaars

The disease usually sets in during the *damp and cold season* "Colds"

; for one month suffices to induce the
y have been eaten for several months

Lathyrism attacks *young persons* by *predilection* and men are more often attacked than women

The disease is also observed among animals (oxen horses pigs geese) The symptoms in horses are shortness of breath (suffocation) caused by recurrent paralysis and sudden death on exertion these symptoms are not observed in man.

SYMPTOMATOLOGY.

The onset of the disease is usually *sudden* occurring frequently at night Digestive disturbances colicky pains and diarrhœa which precede the outbreak, are often unheeded by the patients Sometimes an attack of fever of moderate severity lasting from several hours to a day may precede the period of invasion There may be also pains in the lumbar region and the legs and weakness, tremor and stiffness of the lower extremities so that walking becomes a difficulty Gradually the typical

simultaneously the muscles of the vertebral column on the side opposite to that of the foot advanced become strongly contracted The patients often fall while walking and the parts of the feet dragged over the ground are chafed and rubbed into a sore Finally walking may become quite impossible There is no ataxia.

The *electric excitability of the muscles* of the lower limbs is almost always diminished, the reaction of degeneration is however not observed (Mingazzini and Buglioni)

The arms as a rule are not involved but sometimes there is trembling of the hands

The sensibility of the legs does not always exhibit disturbances Anæsthesia is sometimes observed after prior hyperæsthesia and paræsthesia (formication)

The *cutaneous reflexes* of the legs are occasionally increased or diminished, the *tendon reflexes* on the other hand are always greatly increased and spontaneous clonic spasm appears during walking Vasomotor disturbances are not, as a rule, present

In regard to *trophic disturbances* it is observed that muscular atrophy sets in after the disease has persisted for some time Hattute &c in a series of cases observed in Algiers saw gangrene *of the toes of the feet* and legs, caused by obstruction of the arteries, and ascribed this condition to lathyrism Probably however in these cases it was a question of erg

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tions are left behind Lathyrism *per se* does not cause death

PATHOLOGICAL ANATOMY.

Pathological observations up to the present are lacking Only one *post mortem* examination of little value has been published by Grandjean The patient s death was caused by malarial cachexia and Grandjean found a softening of the spinal column above the lumbar enlargement extending about 6 cm

According to the clinical features of the disease the conclusion must *be accepted that lathyrism is a disease of the lateral columns* of the spinal cord

DIAGNOSIS

The diagnosis of lathyrism, which as a rule appears epidemically offers no difficulties It is especially to be distinguished from *beri beri* with which it has been sought to connect it by the absence of dropsy and cardiac symptoms the spastic symptoms the non participation of the arms in the disease, the infrequency or absence of disturbances of sensation the increase of the tendon reflexes the slight changes of the electrical excitability as well as the disturbances of micturition which are so often present at the commencement of the disease

PROGNOSIS.

The prognosis of lathyrism is good as regards life but bad as regards complete recovery

PROPHYLAXIS

The prophylaxis consists simply in avoiding the lathyrus as a food

TREATMENT.

The chief factor in treatment is the discontinuation of lathyrus as a food

Good results have frequently followed counter irritation in the region of the lumbar vertebræ by means of the thermo cautery or by painting with

a mixture of tincture of iodine and croton oil In addition to this plan of treatment, warm baths electricity, massage &c, are employed and bromide potassium (2 0—5 0 gram daily) has been recommended

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In regard to *trophic disturbances* it is observed that muscular atrophy sets in after the disease has persisted *for some time* Hattute &c in a [illegible]

There are no cerebral symptoms ascribable to lathyrism

The patients living in want and misery are generally much emaciated

In some cases the disease can be cured Mostly however recovery is not complete for permanent spastic symptoms and also real contractions are left behind Lathyrism *per se* does not cause death

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III.

ATRIPLICISM.

Atriplicism, so called by Matignon,[1] is a disease that frequently occurs in North China (Peking) and which is manifested by localised œdemas, disturbances of sensibility and vaso motor and trophic disorders. According to Matignon this complaint is caused by poisoning with atriplex

Atriplex littoralis, the coast orache, is a plant belonging to the family of the Chenopodiaceæ, which appears in two forms in Mongolia and North China as *atriplex angustissima* and *atriplex serrata* The latter, called by the Chinese Lao li ts'ai, grows in Peking and its vicinity as a weed, in the courts, gardens, and along the walls of the houses, its tasty, delicate young shoots are often eaten by the poor people, particularly the beggars, almost raw, either in half cooked bread dough, in a kind of pancake, or as a salad All those that eat the plant do not fall ill presumably because some persons possess immunity, and also because all the shoots of the plant are not poisonous It is said they are never poisonous if well washed and cooked and if the red leaves be picked out Probably the poison is not in the plant itself, but is contained in a parasite clinging to [illegible] Frequently a small species of plant [illegible] on the plant and perhaps the [illegible]site Unfortunately Matignon [illegible] Laveran is of opinion, judging [illegible]

rubbing the shoots on the hands and face were futile, and the hospital attendants also who tore up the plants with their arms bare did not become affected It seems, however, that in these experiments it was not ascertained if the plants in question were infested by the plant lice mentioned or not.

[1] De l'atriplicisme (intoxication par l arroche) China Imp Marit Customs Med Reports 54th issue Shanghai, 1898

The disease occurs almost exclusively amongst *beggars* In 1895 when a famine prevailed in Peking on account of the war between the Japanese and the Chinese, this disease was frequently observed

Age exercises no influence

The *female sex* furnishes the largest contingent of sufferers, but this is not because women have a particular susceptibility to the toxin, but it is explained by the fact that they are more exposed to the noxious influence of the plant, for the woman, as a rule, has to make shift with the scraps that the man chooses to leave her

That the *general feebleness of the body* has a predisposing influence is revealed by the fact that the weakest persons—young or old—always are attacked.

The *onset of the disease* is *sudden*, occurring within 10 or 20 hours after the plant has been partaken of

The *tips of the fingers* sometimes only of the thumb and forefinger, become *cold* and are the seat of painful tingling, and the *backs of the hands* begin to *itch* Almost simultaneously, *i e*, within half or three quarters of an hour afterwards the *backs of the hands* and the *fingers* also begin to *swell* *Cyanosis* of the nails and finger tips sets in the thumb and forefinger being again most affected The œdema quickly increases and spreads over the hands and *forearms* without, however, extending beyond the elbows The œdema does not affect the inner surface of the forearm but forms a sort of triangle, the base of which is situated at the wrist joint and the apex at the external condyle The skin remains pale and feels cold The swelling is as a rule accompanied by sharp pains which are increased by movement and by pressure, or when the arm hangs down In consequence of the œdema the movements of the hand and fingers are hampered, and the fingers are flexed and separated

Within a few hours *swelling of the face* sets in but in rare cases the disease starts from the face Sometimes the swelling is so considerable that the eyes are completely closed In slight cases the swelling is confined to the eyelids and disappears again after twenty four hours The *nose is of a bluish colour and is cold*, often anæsthetic The swelling of the face is attended by little or no pain but it causes violent itching, and in consequence of the scratching ecchymoses of variable extents ensue on the face and arms

Sometimes the œdema is confined to one side of the face and the swellings may not be symmetrical on the arms

The sensibility is diminished on the fingers and there is sometimes complete anæsthesia of the thumb and forefinger Sensitiveness to heat on the other hand is considerably augmented over the affected areas Warmth and the influence of the rays of the sun increase the pain to such an extent that the sufferers are apt to shroud their faces and hands

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hands and forearms persists the œdema occasionally lasting on the hands for ten days

The skin is shed in large patches on the ecchymosed areas Sometimes, even during the first days of the illness *blisters* varying in size from a hempseed to a hazel nut form on the patches, and these through becoming confluent attain the size of a five shilling piece containing a

more or less opaque yellow fluid, when these blisters burst they dry up to impetigo like eschars In other cases, after the œdema has disappeared, the skin appears sodden over the entire area of the ecchymosed patches, and superficial and often painful *ulcerations* which easily bleed result The ulcers may take a month or six weeks to heal, and cicatrisation occasionally ends with the appearance of keloid like formations, a phenomenon not uncommon amongst the Chinese The ulcerations are often accompanied by fever the temperature rising to 38° or 39° The tongue at the same time is furred, the appetite diminished, and the bowels costive In some cases there is enlargement of the lymphatic glands at the elbow and in the axilla

nervous system (medulla oblongata, cervical spinal cord, or peripheral nerves)

The *diagnosis* of atriplicism is not difficult Only two diseases—Raynaud's disease and erythromelalgia—are somewhat analogous In the differential diagnosis between *Raynaud's disease* and atriplicism it

beyond the hand, and cyanosis, disorders of sensibility, ecchymoses and blisters are wanting

The treatment of atriplicism consists at first in the administration of saline aperients later on tonics (quinine, arsenic) are given, and Matignon sometimes added disinfectants to these (benzoate of soda benzo naphthol, salol) Locally oil of hyoscyamus with opium and *chloroform and cold compresses* are applied

IV

LACQUER POISONING.

In China and Japan, the homes of the lacquer industry, a disease often occurs among persons that handle lacquer, such as lacquer tapsters, lacquer dealers and lacquerers this ailment is attributable to the injurious effects of lacquer and is called Urushi kabure, i e, lacquer poisoning by the Japanese

The lacquer is extracted from the lacquer tree, *Rhus vernicifera* (De Candolle), in Japanese called Urushi no ki, a tree belonging to the family of the Anacardiaceæ, and which attains a height of about 8 m. and a circumference of 1 m The tree is cleft by the lacquer tapsters, and the juice that exudes, a treacle like brown balsam which becomes black on exposure to the air reaches the hands of the lacquerer after it has gone through various cleansing processes and received the necessary additions of colour

The lacquer disease is originated not only through *direct contact*, but also through *evaporation of the lacquer* The poison, whatever it is, is of an evanescent nature, for the poisonous properties disappear with the drying of the layer of lacquer A considerable portion of the poisonous influence is removed during the process of preparing the various sorts of lacquer and the stirring of it in open vessels Raw lacquer and its [illegible]

forbid their children to touch the trees

The susceptibility of individuals to the poison varies remarkably Gortz mentions the case of a lady who became affected every time she visited a lacquer ware warehouse in which there were newly lacquered articles

There is no such thing as becoming used to the poison The belief prevalent in Japan that every lacquer worker must have the disease once and thereafter is immune, is stated to be fallacious by Görtz, who repeatedly saw patients who had been attacked for the fifth and sixth time.

The usual symptoms of lacquer poisoning are as follows A few hours after the poison has taken effect, the patient is in a slightly feverish condition and complains principally of itching and a disagreeable feeling of tension of the skin of the head, face and limbs Soon after œdema of the affected parts of the skin sets in with catarrh of the contiguous mucous membranes (rhinitis, conjunctivitis, &c) Small red papules rise on the œdematous skin, they gradually increase in size and small blebs with sero purulent contents form on their apices. On the arms the

eruption usually extends to the elbows on the legs to the knees and at these limits sharp lines of demarcation are perceptible In men the scrotum and the prepuce always participate in the œdema and in women the labia majora are similarly affected

The congestive symptoms may be so severe in serious cases that cerebral symptoms of considerable intensity may be set up The fever in such cases is very irregular but the temperature does not usually exceed 39°

The pustules which frequently become confluent dry up or burst and become covered with eschars, but large purulent ulcerations may result

The disease never has a fatal termination

In China accord ng to Du Halde the workers in lacquer *prophylactically* rub the r been bo led after work they re and a kind of amaranth ney cover the head with a linen apron In Japan it is not

The treatment consists in energetic washing with soap and smart scrubbing of the skin immediately after the poison has taken effect in order to remove as much of the poison as possible After the onset of nflammation by such qua plumbi lime ed, sponging the ternally is used as an antidote

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POISONING THROUGH SNAKE VENOM (OPHIDISM).

THERE are *poisonous snakes* (*Thantophidii*) in most countries of the torrid and temperate zones but they are particularly numerous in tropical countries, as, for instance, in British India, where 20,000 persons (in 1898, 21,921) yearly fall victims to snake bites

Poisonous snakes are divided into two classes—the *viperines* and *colubrines*—distinguished from each other by their structure and by the qualities and toxic effect of their venom in the former the poison fangs are pierced throughout their centre thus forming tubes, whereas in the latter they are merely furrowed

The most important of the vipers are the *rattle snake—Crotalus*—of which there are several species in North and South America, the *lance snake—Trichonocephalus lanceolatus*—Wagl (Martinique and Santa Lucia), the *jararaca—Trichonocephalus jararaca pr*—Neuwied (Brazil), the *mocassin* snake—*Trichonocephalus piscivorus*—Holbr (North America), the *Trimeresurus viridis*, Merr (East Indies and China), the

serpents, or *hydrophidæ*, which principally live in the Indian and Pacific Oceans, and thence ascending the rivers endangering the lives of bathers, of those the most common

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The treatment consists in energetic washing with soap and smart scrubbing of the skin immediately after the poison has taken effect in order to remove as much of the poison as possible After the onset of the eruption, means should be taken to check the inflammation by such means as cold compresses, tepid baths, dressings with aqua plumbi, lime water, or astringent decoctions of oak bark may be used, sponging the surface with a solution of carbolic acid is also of service

In Japan the juice of the common garlic applied externally is used as an antidote

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The most important *colubrines* are The *coralline snake*—*Elaps corallinus pr.*—Neuwied (Brazil and Mexico) the *spectacled snake*—*Cobra di capello naja tripudians*—Merr (East Indies) *Cleopatra's snake*—*Naja haje*—Merr (Africa), the *Crait*, or *blue adder*—*Bungarus cæruleus*—Daud (East Indies), the *black snake*—*Pseudechis porphyricus*—Wagl (Aus

ta), the

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snakes it amounts on an average to about 1050

The quantity of venom ejected depends on the size of the snake A rattle snake loses about 0 25—0 3 g at every bite, a common viper, on

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In China according to Du Halde the workers in lacquer *prophylactically* rub their faces and hands with rape seed oil in which pork has been boiled after work they rub in a decoction of chesnut and pine bark saltpetre and a kind of amaranth (Amaranthus tricolor) made with water During work they cover the head with a linen mask and the upper part of the body with a leathern apron In Japan it is not customary to use any such precautions

The treatment consists in energetic washing with soap and smart scrubbing of the skin immediately after the poison has taken effect in order to remove as much of the poison as possible After the onset of the eruption means should be taken to check the inflammation by such means as cold compresses tepid baths dressings with aqua plumbi lime water, or astringent decoctions of oak bark may be used, sponging the surface with a solution of carbolic acid is also of service

In Japan the juice of the common garlic applied externally is used as an antidote

Similar inflammations of the skin are set up by the juice of other kinds of rhus more especially rhus toxicodendron (Michx) rhus lobata (Hook) rhus venenata (de Candolle) rhus pumila (Michx) rhus perniciosa (Kth and others) all these plants are natives of America

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snakes), sometimes, on the other hand, they are contracted, but react to light (after the bite of the cobra) Sometimes, particularly after bites of the Indian vipers, a hæmorrhagic tendency developes, and petechiæ bleeding of the nose spitting of blood, vomiting of blood, bloody stools,

for several years or may persist during life The disturbances referred to consist in frequent attacks of pain, swelling, &c, of the bitten spot, with gastric disorders, and these symptoms are repeated every year at the period of the year the injury was inflicted Much more rarely the patients

particularly the case after the bites of vipers

Microscopically Nowak found fatty degeneration in the *liver* and

Crait snake and the sea snakes) are accounted as almost certainly fatal if the snakes are of large size and immediate help is not at hand Of those bitten by venomous snakes 25—35 per cent die in India 25 per cent in America and 7 per cent in Australia

Treatment has a twofold purpose (1) *To prevent the absorption of the venom*, and (2) *to remove the venom from the bitten place, or to render it abortive locally*

the other hand only 0 03 g of venom Through repeatedly biting the supply of venom becames exhausted and is only slowly replaced

The snake venom contains at least two *poisonous albuminoid bodies* (*toxalbumin*) of which one acts locally on the tissue of the bitten spot and its vicinity, the other after absorption causes paralysis of different nerve centres, particularly the respiratory and vaso motor centres, it also has a paralytic effect on the myocardium and the cardiac ganglia By being heated to 80° for ten minutes the poison, which acts locally on the tissues can be removed without causing the paralysing effects to disappear

The toxalbumin is contained in the venom of different species of snakes in different proportions, so that after the bite of one the local effect is less pronounced than the remote effect, and *vice versa* Thus the

size and strength of the snake and the quantity of venom inoculated which may be small if

The symptoms moreove

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weakly persons run the

influence, those parts of the body that can be seized by the snakes in their jaws, as the fingers and toes, in which the poison fangs can penetrate more dee[illegible]

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mostly slight like the prick o a needle More rarely the pain is [illegible]

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ness in the injured parts sets in caused by the pressure of the infiltrated tissue on the nerves beneath and the temperature of the part falls [illegible] lymphatic glands become enlarged and phlegmonous [illegible]oms [illegible]um [illegible] and [illegible] suppurate In this manner a fatal issue disturbance only weeks after the bite [illegible]toms cause death far more frequently

Occasionally when the bite has pierced a vein, death ensues in from five

restlessness and dyspnœa set in The features become p[illegible] [illegible] cold clammy sweat breaks out The pulse is [illegible]on is retarded Respira[illegible] [illegible]w and superficial With [illegible]rhœa, profuse salivation

thirst, gastric and abdominal pains, and the urinary secretion is generally quite suppressed. Transient loss of consciousness, or coma and convulsions especially in children, may set in. Sometimes symptoms of paralysis are manifested, the power of speech and capability of swallowing being arrested. The pupils are sometimes dilated and fixed (after the bites of the rattle snake, Indian vipers and the poisonous Australian snakes), sometimes, on the other hand, they are contracted, but react to light (after the bite of the cobra). Sometimes, particularly after bites of the Indian vipers, a hæmorrhagic tendency developes, and petechiæ, bleeding of the nose spitting of blood, vomiting of blood bloody stools, &c, set in. Occasionally also icterus and multiple abscesses are observed.

Death which seldom occurs before from six to twelve hours after the bite of even the most dangerous venomous snakes is caused by respiratory paralysis. Nevertheless it is impossible to prolong life by artificial respiration, as the venom simultaneously has caused paralysis of the heart.

Should the condition tend to a favourable issue the patients often recuperate wonderfully quickly. Occasionally recovery is slow extending over weeks and even months. After bites of the Indian vipers albuminuria is observed during convalescence. In isolated cases disturbances remain for several years or may persist during life. The disturbances referred to consist in frequent attacks of pain, swelling, &c. of the bitten spot, with gastric disorders and these symptoms are repeated every year at the period of the year the injury was inflicted. Much more rarely the patients develop an exquisite cachexia.

The *anatomical changes* found in persons that have died of snake bite are trifling. The tissues in the vicinity of the bite are permeated by œdema and hæmorrhages and the vessels are distended. The blood is sometimes liquid, sometimes more or less coagulated. Hæmorrhages are found in the most diverse organs particularly after the bites of vipers. The cerebral meninges are often hyperæmic and the cerebral ventricles filled with opaque fluid. In other cases on the contrary, there is anæmia of the contents of the cranial cavity. The lungs are generally hyperæmic the mucous membrane of the bronchi injected. The kidneys are sometimes normal and sometimes exhibit extensive hyperæmia, the latter being particularly the case after the bites of vipers.

Microscopically Nowak found fatty degeneration in the liver and kidneys, and rapid necrosis of the hepatic cells and renal epithelia, as also a few small round cell infiltrations along the bile ducts. Probably these organs try to excrete the venom and thereby become affected.

The *diagnosis* of snake bite seldom offers any difficulty being founded on the statements of the patient or his companions. The snake is often killed and brought with the sufferer to substantiate the statement which is moreover confirmed by the evidence of the bite. At the place bitten two small wounds are seen having the appearance of pricks by a needle, and bleed but little if at all. They can mostly be seen with the naked eye but occasionally can only be recognised by means of a magnifying glass.

The *prognosis* largely depends on the kind of snake. The bites of the venomous snakes of India (chain viper echis carinata, hooded cobra Crait snake and the sea snakes) are accounted as almost certainly fatal the snakes are of large size and immediate help is not at hand. Of those bitten by venomous snakes 25—35 per cent die in India 2 per cent America and 7 per cent in Australia.

Treatment has a twofold purpose. (1) *To prevent the absorption of venom*, and (2) *to remove the venom from the bitten place, or to render* *ab... it innocuous locally*

The first thing to do to prevent the venom being absorbed is to apply a ligature close above the wound, sufficiently tight to arrest the flow of blood in the blood vessels For this purpose anything at hand is taken —a belt, a twisted cloth, a thong, an india rubber cord, &c —and tied firmly around the limb above the seat of the bite, the ligature is then tightened by passing a stick under it, and twisting it so as to form an improvised tourniquet Should the bite be situated on any part of the body where a ligature cannot be applied, as on the face, the place must be immediately cut out If it be on a finger or toe, and caused by a large

only be attempted if the lips and mucous membranes of the mouth are free from cracks or injuries and, when it is the question of large quantities of venom the process as Fayrer demonstrates is not free from danger, as snake poison may be absorbed by the mucous membranes (conjunctiva, stomach) as well as by the serous membranes

The next process is to at once destroy the poison, and this is done either by *red heat* (thermo cautery, galvano cautery) or by chemical

dotes with local effects are very numerous, but three only have stood the test of critical experimental proof, these are *permanganate of potash*, *lime* Next to the ligature they in the case of snake bite Per ced as a means of treatment by olution *chloride of gold in 1 per* 2 per cent solution, of these 8—10 ccm are to be injected into the wound and its vicinity Chloride of lime must be prepared fresh and filtered It is therefore advisable always to have a strong solution (about 1 10) ready, and to dilute it before use to the strength required with boiling water

The so called *snake stones* which are much used in India and which consist of bezoar stones (concretions from the stomach of various animals) of artific al products from burned hartshorn &c have proved useless They are laid on the wound and their use would seem to arise from their power of absorption

After the poison has been destroyed at the spot bitten the ligature is removed, and the further treatment of the wound is antiseptic Threatening collapse may be averted by giving *stimulants* (alcohol, ether camphor) Alcohol is especially indicated and the patient should be given alcohol in quantity short of inducing a condition of inebriation Mulled wines these being useful as exciting ng the elimination of the venom horesis the patient should have a with warm blankets

As the poison is excreted through the mucous membranes of the stomach, Sir Lauder Brunton and Alt recommend *washing out of the stomach* with alcohol (brandy)

Ammonia and *strychnine* are also used as stimulants, the former is

especially recommended by Halford and the latter by Müller. Ammonia is injected intravenously and strychnine subcutaneously.

In other particulars the treatment is symptomatic, under some conditions narcotics would seem to be indicated

Recently favourable results have been achieved by *serum therapy*, of which Phisalix and Bertrand, Calmette and Fraser, are the pioneers.

The "antivenene," which is prepared by Calmette in the Pasteur Institute in Lisle,[1] is derived from horses or asses that have been immunised by gradually increased doses of snake venom from various snakes (such doses being at first mixed with chloride of lime) According to Calmette, his preparation protects from intoxication and death if administered within two hours after the bite, and its effect is most efficacious when injected intravenously

If kept cool and protected from light it retains its effect for over a year The dose needed for a man averages 10 to 20 ccm In serious cases it is as well to increase the dose to 30 or 40 ccm

Calmette, however himself desires that, even with serum therapy at hand, ligature and cauterisation, or chloride of lime, should not be neglected

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on it and setting it alight

Besides these, the remedies which have been recommended as *antidotes with local effects* are very numerous, but three only have stood the *test of critical experimental* p *chloride of gold*, and, above all, c constitute the most efficacious manganate of potash which wa Lacerda, is used *in a 3 or 5 pe* cent solution, and chloride of 8—10 ccm are to be injected into the wound and its
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As to *prophylaxis*, the first indication is the extermination of venomous snakes by paying a premium for each one killed but this method has resulted in India in the breeding of snakes The next method is the cultivation of waste territories which, like the jungles of India, are the principal resorts of snakes

In order to prevent the frequent intrusion of snakes into dwellings in India, Fayrer advises that the walls of houses be smeared with carbolic acid, which acts as a powerful poison to snakes, and to the smell of which they have a great antipathy On hunting and other expeditions one should protect oneself against snake bites by wearing high boots or gaiters Some snakes, however, bite through the thickest leather, and some spring up to bite and may even wound the face When camping in the open the greatest care must be exercised

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VI

AFFECTIONS CAUSED BY OTHER VENOMOUS CREATURES

The temperate zone with the exception of venomous snakes does not lack poisonous creatures but the d sturbances caused by such insects as bees wasps hornets ants gnats stinging flies gad flies fleas and bugs are but sl ght Conditions are different with various venomous creatures of warm countries the sting or bite of which may occasionally

ass
ind
tly
opaque acid reacting venom is secreted Their *bite* is recognisable by two minute specks of blood The scolopendra are nocturnal in

tongue or in the mouth suffocation may ensue from the swelling The local symptoms are occasionally accompanied by general symptoms such

(2) **Scorpions** — Scorpions wh ch are widely distributed in the tropics, *belong to the class of arachnoidæ or spider-like animals They* possess a sting and a poi on gland situated at the end of the narrow posterior division of the abdomen The venom is of an ac d character

r stoi es in
at night and

a native of
Southern Europe and Italy is not more serious than the stings of bees and wasps The various exotic scorpions are far more dangerous and they are distinguished by their remarkable size measuring at times 16 cm

in length, such are *androctonus funestus*, Ehrenb (North and Central Africa), *buthus afer*, Lin (Africa, East Indies), *buthus occitanus*, Amour (Italy, Greece, Spain, Northern Africa) There is a species of scorpion in Durango in Mexico which, according to Cavarroz, kills 200 to 250 children yearly in a population of 15,000 souls

The disorders caused by scorpions are partly local, partly general The local symptoms consist of severe pains, œdema, lymphangitis adenitis, and gangrene The general symptoms are vomiting, diarrhœa icterus, acceleration of the pulse and respiration, terror, oppression, restlessness, fever, decrease of strength, swoons paralysis of the peripheral nerves, convulsions delirium coma and sometimes within twenty four to thirty six hours death occurs Sometimes, also tetanus is observed, but this is probably attributable less to the scorpion venom than to an infection of the wound with tetanus bacilli A peculiar symptom mentioned by Dalange and Guyon (Algiers), as occurring after scorpion stings, is violent erection of the penis Posada Arango (Columbia) states that immediately after the injury has been inflicted a sensation of numbness and heaviness of the tongue, a kind of complete paralysis of the lingual and hypoglossal nerves, set in

lead to the poison glands in the terminal articulation of the feelers The venom of spiders is likewise very acid

The following spiders deserve mention The *Miner spider* of Costa Rica—*Arana picacaballo*, a kind of mygale spider found in Italy, France, Switzerland, and rarely in Germany (Bingen)—*chiracanthium nutrix*, Walck, the common *malmignatte*—*Theridium tredecim guttatus* F—which is found in Italy, Corsica and Sardinia, the *karakurte* of the Kirgise Steppes—*Latrodectes lugubris* (Matschulski), which is particularly dangerous to camels, horses, and cattle, the native *tarantula*—*Tarantula apulica* (Rossi) of Italy, Spain and Portugal, the *Russian*

spread thence more or less over the entire body, local inflammation may be but slight or even entirely absent Sometimes nausea, vomiting, thirst, dyspnœa, oppression, anxiety, restlessness great weakness coldness of the extremities headaches, and occasionally even convulsions set in After the bite of the karakurte a typhoid condition has been observed to develop and death ensues in two or three [illegible]

[illegible]

[illegible] Argas family, which also by means of which they may

The Persian poison bug, Argas Persicus (Fischer), which is also found in Egypt, lives in cracks in the ground and walls of old houses, crawls over people at night, in the same manner as our bugs, and when sucking blood they inject some venom into the wound, causing severe pain

remittent fever, and sometimes even causes death Natives of the country possess a relative immunity, and this fact is considered to be owing to

Along
Argas mo
hides in
food, whe
pain and
to the abdomen, to be followed by vomiting and stools containing blood with or without fever The illness lasts a few days or weeks, and in some cases has a fatal issue

turbances

In all these cases,
of the ticks in questio
parasites, of which the
the bite This is the case with another kind of tick, the *ixodes bovis*, and

ks
he
crevices, and to use insect powder If ticks are found ... the skin they should not be torn off, as their proboscis is easily separated

are the *scorpæna scropha* of the Mediterranean Sea, *trachinus* ... (Cuv et Val) found in European waters, the John Dory—*trachinus draco* (Cuv et Val) found on the coasts of Europe and the West Coast of Africa, *synanceia brachio* (Lacep), East Indian Ocean and Polynesia, and *pelor japonicum* (Cuv et Val) Japan

The stings or punctures from such fish induce local symptoms, of

gangrenous symptoms rapidly spread to the arm, necessitating the amputation of the forearm eleven days after the injury had been inflicted

Other fish poison by their *bite*, being provided with poison teeth on their palates. Such are the *conger eel*—*Muræna helena*, Lin., found in the

harbour a poisonous material to *partake* of which would be *injurious*. Their *spawn* in particular is poisonous, and other organs in a less degree; the flesh itself is, however, innocuous. The poison is not destroyed even if boiled for hours, and people have been known to have been killed by it.

Poisoning by *tetrodon* is well known, especially in Japan, where there are several species; they are called *fugu* by the Japanese, and are often used for suicidal purposes. The symptoms set in three to fifteen minutes after eating the fish, and consist of an unpleasant sensation in the region of the stomach, abdominal pains, burning in the fauces, nausea, severe headache, collapse and fainting; death may occur in a few hours from paralysis of the respiratory muscles and heart.

Diodon sets up similar symptoms. The constitutional effects induced by *barbus* resemble cholera nostras. *Meletta* causes severe gastro-enteritis, with symptoms of paralysis and convulsions. A fatal issue may likewise result from these poisons.

The *treatment* consists in immediately emptying the stomach of its contents by means of emetics or the stomach pump. Stimulants, artificial respiration, faradisation of the diaphragm, should also be tried. Goertz saw good results in one case (tetrodon) from subcutaneous injection of strychnine (0.002).

Miyake from four principal

peculiar ailment characterised by symptoms resembling intermittent fever, accompanied by a reddish blue exanthem and nervous symptoms.

The construction of Japanese dwellings, being mostly of wood, allows rats to house in them, and in consequence it frequently occurs that people are bitten by these animals during sleep or when engaged in their capture.

a question of illness in rats suffering from a disease analogous to rabies in dogs. Perhaps a specific bacterium in the sputum of the mad rats is the cause of rat bite disease, although hitherto nobody has as yet met with

but *individual predisposition* seems to play an important part in the etiology.

Certain foods, chill, and bodily hardships are given as determining *causes*.

The *period of incubation* is said to be remarkably diverse, and may

fluctuate between a few hours and several years (?) In the majority of cases however, it lasts between one and three weeks

The onset of the actual disease is preceded by indefinable *prodromal*

with fever that sets so an inflammatory , healed The part bitten swells becomes indurated assumes a bluish red colour and becomes *more or less painful* During the further course vesicles form on it or the spot becomes gangrenous In rare cases there may be a total necrosis of the affected part as for instance of a finger or toe The neighbouring lymphatic glands swell and lymphangitis frequently develops

The *fever* is of a characteristic intermittent type attacks of fever of two or more rarely of three days duration alternating with afebrile intervals of three or four days or more rarely of two, five or six days The height of the fever varies between 38 5° and 40—41° The pulse averages 110—120 beats per minute

General languor, pains in the limbs, rheumatoid muscular pains heaviness of the head headaches, dizziness, singing in the ears photophobia, *darkening of the field of vision precordial agony*, *secretion* of sweat, loss of appetite thirst nausea, and occasionally diarrhœa or constipation, and in rare cases delirium and coma, are all symptoms that may set in with the fever

The patient soon becomes weakened *the face looks pinched the* complexion cachectic, and slight œdema appears on the face, hands and feet Icterus has never, hitherto been observed The liver and spleen are not enlarged but sometimes albumen and casts are found in the urine

Increase or loss of the patellar tendon reflexes is frequently exhibited and sensory (paræsthesia anæsthesia) and motor disturbances (paresis) particularly at the extremities occur

The characteristic feature of the disease is a peculiar *erythematous or papular exanthem* on the face, neck, trunk and limbs It consists of reddish blue, flat or raised, spots (reminiscent of erythema exsudativum) varying in size from a pea to the palm of the hand The exanthem appears usually with the first attack of fever, but sometimes only sets in with the third or fourth attack, or even later The rash lasts three or four days and disappears with the fever, to break out again when the *fever recurs*. Towards the end of the disease moreover, an irritative urticaria is set up

recovery Of thirty eight cases recorded ath usually takes place in con

the bite after recovery, which

four or five weeks, in serious cases it lasts *two or three months* *but cases occur* which extend for over a year

t and is always accompanied with

mptoms is again *divided into* an curs very rarely and runs a rapid

[illegible]

or longer

In the *abortive form* there are one or two attacks of fever with more or less pronounced general and nervous symptoms and an exanthem The course compared to that of the other forms is very much shorter and the patients recover rapidly

As regards the *pathological anatomy* of rat bite disease only one case hitherto has been examined *post mortem* In this case there was increase of the cerebro spinal fluid and hyperæmia of the pia mater of the spinal cord, otherwise macroscopically there was no specific change in the organs

The *diagnosis* of the disease supported by the presence of a wound from a rat bite, is founded on the three cardinal symptoms intermittent fever, the bluish red exanthem, and muscular pains

[illegible]

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VII

KUBISAGARI.

Kubisagari (i e, one who hangs his head) is the name of a disease which is endemic in a certain district of the Aomori and Iwate-Ken in the north east of the principal Island of Japan According to Miura the disease is manifested by attacks of dimness of sight, diplopia, paresis of the cervical muscles in consequence of which the head drops (hence the ... ie trunk and extremi-

... depression, increase of the nasal, lachrymal, and, perhaps also salivary, secretions, increase of the patellar tendon reflexes

Miura has compiled the following scale of the frequency of the various symptoms from 63 cases observed by him —

Dimness of vision	40 times
Ptosis	38 ,,
Paresis of the cervical muscles	34 ,,
Diplopia	29 ,,
Paresis of the upper limbs	26 ,,
,, ,, lower limbs	24 ,,
,, ,, muscles of the trunk	18 ,,
,, ,, tongue	16 ,,
,, ,, masseters	12 ,,
,, ,, lips	11 ,,
[illegible]	5 ,,

... The movement of ... uble images always ... internal ocular recti ... ly found hyperæmia

... eral hours, and may come on in varying frequency, sometimes several times in one day The attacks may be produced by bodily exertion, particularly in a bent position when the stomach is empty, by trying the eyes, by hunger, or by indigestible food

The *intervals* may be free from symptoms, or occasionally slight ptosis, a certain weakness of the cervical muscles, and increase of the tendon reflexes may persist

The d sease may last for many years but never has a fatal issue

The d sorder mostly sets in *d iriг g tl e warm seaso ı* (May to October) It disappears during the winter only

It is mostly observed amongst

rarely in towns and then only in pei

are largely engaged in agr culture

Sex and age exerc se no influence and *house ep demics* frequently occur

The d str cts in which kub sagari rages are the most notorious reg ons in Japan for *horse and cattle plagı e* and Miura cons ders the disease has some connection therewith The peasants dwell under the same roof as their cattle so that their dwell ngs are directly connected w th the stables and are exposed to their effluvium It s to the effects of th s effluvium that Miura attributes kub sagari and he identifies it w th a d sease that occurs n French Switzerland espec ally in the Canton of Geneva wh ch was first described by Gerl er in 1886 under the des gna

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Iay hen Prov nzen Japans endem sche aralysant vert ge ptos que) M tt o 1896 III No 3 p 259

III.—DISEASES CAUSED BY ANIMAL PARASITES.

The disease may last for many years but never has a fatal issue

The d sorder mostly sets in *during the warm seaso i* (May to October) It disappears during the winter only

It is mostly observed amongst rarely in towns and then only in per are largely engaged in agriculture

Sex and age exercise no influence and *ho se ep demics* frequently occur

The districts in which kub sagari rages are the most notorious reg ons in Japan for *horse and cattle plague* and Miura considers the disease has some connection therewith The peasants dwell under the same roof as their cattle so that their dwellings are directly connected with the stables and are exposed to their effluvium It is to the effects of th s effluvium that Miura attributes kubisagari and he identifies it w th a d sease that occurs in French Switzerland especially in the Canton of Geneva which was first described by Gerl er in 1886 under the designa bitants ology

results

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III.—DISEASES CAUSED BY ANIMAL PARASITES.

I.

THE DISEASE OF DISTOMUM PULMONALE.

HISTORY.

[illegible]

GEOGRAPHICAL DISTRIBUTION.

Hitherto Japan, North Formosa and Corea, are known as the geographical region of distribution of disease due to the distomum pulmonale. Stiles has lately also observed a case in North America, and Naunyn saw a case in Strasburg in a colonist who had lived in Mexico and California for fifteen years[1] Its region of distribution is probably wide Perhaps the hæmoptysis so common in Foochow[2] and North China,[3] is due to the presence of the ova of this parasite, and [illegible] not observe the disease

[illegible] is distributed on the [illegible] Awomori, Sendai, Izu, [illegible] mu in the provinces of [illegible] particularly prevalent

[1] *Deutsch Med. Woch.*, 1897, Vereins Bei l, No 20 p. 145.
[2] *Amer Jour of Med. Science* 1883 April, p 517
[3] Schofield *The Lancet*, 18[illegible], December 9

in Okayama and Kumamoto In a few of the villages it is said that nearly all the inhabitants are affected by the distomum pulmonale The affected districts in the above provinces are all situated in mountainous regions

Maxwell (*Journal of Tropical Medicine* December 1899 p 116) published a case of paras tic hæmoptys s from Chang poo (China) The ova described by him however are smaller (28—32 μ 20 μ) than those of distomum pulmonale and have a different appearance

NATURAL HISTORY.

The distomum pulmonale (see figs 30 and 31) is according to Leuckart a thick and plump worm 8—10 mm in length and 4—6 mm in breadth of a brownish red colour and oval shape It is rounded at the extremities usually a little smaller posteriorly and quite circular on transverse section

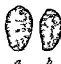


FIG 30 —*Distomum pul monale*, natural size After Leuckart *a* Dorsal posi tion *b* profile

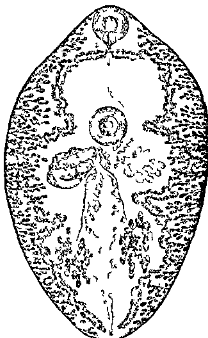


FIG 31 —Enlarged 10-fold (dorsal position) After Leuckart

— — nt the anter or sucker is almost
stance
ıle and
ıternal
other
distoma

The *ova* (see fig 32) are of an oval shape and possess a brown
' is often provided with a lid Three
otoplasm lie in the shell, and if the
ver glass the contents escape The

length of the ova is given by Bälz as 0 08—0 1 mm and the breadth as 0 05 mm I found them somewhat smaller, on an average 0 061 mm long and 0 012 mm broad

Manson and Nakahama succeeded in developing the *embryos* in from four to eight weeks [illegible] ciliated on all sides, [illegible]

The further fate [illegible] contradict the assu[illegible]

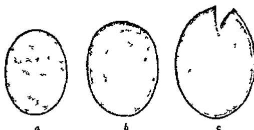


FIG 32 —Ova of the *distomum pulmonale* from the expectoration. Zeiss Obj F, Oc I a, Without lid b with lid c, burst empty shell

host They probably at first are taken up by an intermediate host, perhaps a fish, a freshwater snail or a mussel, in which the immature distoma are propagated and by some means or other finally reach their destination, man According to Leuckart it is doubtful if they immediately reach the lung The most probable conjecture is that they only get to the lung as a part of a general infection

Distomum pulmonale occurs in animals as well as in human beings. The worm according to Leuckart is identical with the *distomum Westermanni* discovered by Kerbert in the lungs of two tigers who died respectively in the Zoological Gardens of [illegible]

American specimens were larger than those of Asia.

ETIOLOGY

The diseases caused by distomum pulmonale occur principally in the male sex—in youths and men in the prime of life Old men, children and women are rarely attacked. My patients were all strong, healthy males between 14 and 41 years of age, according to Yamagiwa, intemperance appears to afford a predisposition

We are ignorant of the manner and method of the infection, as we [illegible]

[1] J L Janson *Mitt der deutsch Gesellsch für Natur u Völkerk Ostasiens*, v, [illegible] p 31[illegible]

[2] Ct f *Bakteriol u Parasitenk* [illegible], No 1[illegible] 11, p 3[illegible]2, 1895 Nos 9, 10 p 304

PATHOLOGICAL ANATOMY.

The *lung* is by predilection the seat of distomum pulmonale The parasites are there found either free in the *smaller bronchi* or in *cyst like cavities* which are apt to be situated at the periphery of the organ, like hæmorrhagic infarcts These cavities are of different sizes, but as a rule attain the size of a hazel nut, they are surrounded by a firm wall of variable thickness consisting of a neoplasmic connective tissue, with round cell infiltrations and coiling of the vessels in the vicinity

They communicate with the lumen of the bronchi by means of fine sieve like openings in some instances they appear as sac like diverticula of the bronchi Neighbouring cysts are often connected with each other by channels, and several may become confluent through atrophy of the septa Besides one or several distoma and ova they contain a pulpy, reddish mass consisting of mucus, blood corpuscles disintegrated elements of lung tissue and Charcot Leyden s *crystals* Occasionally no worms but ova only are found in the cysts The bronchi and lung tissue in the vicinity of the cysts are hyperæmic, and over the cysts the lung is adherent to the thoracic wall or the diaphragm and the diaphragm to the liver

In the *brain* also the distomum pulmonale occurs Otani, in one case found the worm in *cysts* similar to those in the lung which was likewise affected

In one case Yamagiwa found ova in the cerebral centres Their presence there was undoubtedly due to embolism

however, was not found.

According to Yamagiwa, besides being observed in the lung and brain, cysts and fibrous nodules containing ova have been found in the mediastina diaphragm, mesentery and omentum, ova also have been seen in the interstitial connective tissue of the liver in hepatic cirrhosis

— der Kais Japan. Univ zu Tokio iv, No. 11 agiwa and especially paras te

SYMPTOMATOLOGY.

The patients generally have nothing to tell about the commencement of the disease. Very gradually a very slight *cough*, or even only *clearing of the throat*, sets in with a little expectoration, which is most observable in the morning

The sputum ex[illegible]
thick, viscid and m[illegible]
spots or streaks ; o[illegible]

[illegible], besides ova, of
[illegible] pigment in the
[illegible] Charcot Leyden's

The number of ova in the sp[illegible]
ever, it will be found that th[illegible]
is the sputum, and the less [illegible]
crystals will be present Sor[illegible] more than 100 ova will be seen in one preparation, so that several thousands are daily coughed up by the patients Bälz computes the daily minimum number of eggs expectorated at 12 000

In rare cases it is observed that the parent distoma also are expectorated. Taylor mentions such a case in Japan

Occasionally it happens that the blood in the sputum can only be confirmed by the microscope, but on the other hand severe hæmoptysis may set in Bälz observed a case in which the patient lost nearly a pint of blood within a few hours This happens particularly after exertion, when coughing and expectoration are apt to provoke the hæmorrhage The cold season also causes the expectoration to be aggravated

Exceptionally the patient complains of a feeling of pressure, heat, irritation, or occasional pains in the chest

[illegible] undisturbed

The cough and sputum often disappear for months and then return

[illegible] recorded, that in opposition to the prevailing ideas, the lung tissue itself is not markedly sensitive Even the cough which accompanies the hæmoptysis

PATHOLOGICAL ANATOMY.

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der Kais Japan. Univ zu Tokio, IV., No I L
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pulmonale, especially
to another parasite.
rectum

SYMPTOMATOLOGY

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The sputum exhibits an exceedingly characteristic appearance It is thick viscid and mucus and shows light and dark red or reddish brown spots or streaks or it may cons st of small red or reddish brown lumps The colour of the expectoration is caused partly by the admixture of blood and partly by the ova described above (page 354) The ova can be discerned with a magnifying glass as little brownish spots On being microscopically examined the sputum is found to consist besides ova of red and white blood corpuscles alveolar epithelium blood pigment in the form of yellow and black flakes and large and small Charcot Leyden s crystals, I once also observed elastic fibres

The constant occurrence of Charcot Leyden s crystals is particularly interesting from the c rcumstance that they are also frequently observed when other parasites are present They are found in the sputum of persons suffering from echinococcus in the lungs and they have b en observed n the intest nal evacuat ons when intestinal worms particularly anchylostoma are present (see below)

[illegible]

patients Balz computes the daily minimum number of eggs expectorated at 12 000

[illegible] distoma also are expec tore [illegible]

[illegible] the sputum can only be con [illegible] hand severe hæmoptysis may set in Balz observed a case in which the patient lost nearly a pint of blood within a few hours This happens particularly after exertion,

[illegible]

undisturbed

[illegible]

only sets in when the cyst containing the worm opens into the bronchi and the contents are discharged into the trachea The only grave danger which threatens the patient, is that the destruction of the lung tissue may extend to one of the larger vessels and induce severer hæmorrhages Death from hæmorrhage does not seem to have been observed Should, however, great hæmorrhages be repeated frequently, the patients become anæmic and easily fatigued, palpitation, dyspnœa and dropsy ensue, leading to a fatal issue

The disease is more serious when the distomum takes up its seat in the *brain*, or when its eggs reach this organ through embolism, a condition which the observations of Yamagiwa and Otani, mentioned above, prove The symptoms of disease set up under these circumstances depend on the part of the brain affected, but principally consist in *epileptiform convulsions* and other symptoms of a *cerebral tumour*

surface

In other situations the parasites induce no symptoms Sometimes ova are found in the stools, owing in all probability to the sputum having been swallowed

DIAGNOSIS

The diagnosis of the pulmonary affections induced by distoma is simple enough when on microscopic examination the ova are found in the sputum

Should *cerebral symptoms*, especially epileptiform convulsions or symp-
patients suffering from this
uch symptoms being caused
e brain, more especially in
emic. Of course it will be
The great frequency with

[1] *La distomatose pulmonaire par la douve du foie.* Paris 1895.

which according to my experience epileptic convulsions occur i probably at least partly due to this parasite.

PROGNOSIS

The prognosis of the disease is in general, good Complet however, has never yet been positively observed, but provid severe pulmonary hæmorrhages set in, there is no direct dan When the affection is complicated with tubercular phthisis the is unfavourable The disease is always very grave when th attacked

PROPHYLAXIS

In orde
the choice
endemic
or filtered
mussels, vegetables &c) with which the parasite may possit veyed into the body Yamagiwa s advice also deserves att namely, to collect the sputum of patients in certain vessels ar patients should never be permitted to spit on the groun water Attention to these details might cause the gradual ex the worm

TREATMENT

The treatment of this pulmonary disease is symptomatic parasiticidal methods have been tried partly as internal rer

achieved hitherto by this method of treatment have not bee couraging for the patients usually succumb from exhaustion, the offending seat of disease has been removed

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II

DISTOMUM HEPATICUM

HISTORY.

In 1874 McConnell n Calcutta d scovered a new D stomum in the liver of a China

Ijima in Japan found the same worm in the cat

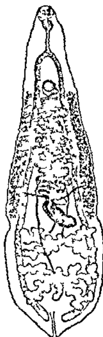


Fig 33 — *Distomum spathulatum* (enlarged 15 times) After Leuckart

NATURAL HISTORY

ventral which is situated at about a quarter of the entire length of the worm from the oral sucker The œsophagus is short the intestinal diverticula on the other hand are of considerable length and reach to the end of the body In the posterior quarter of the body two conspicuous testicles are seen one behind the other and more towards the

ovary

The eggs which are 0 028 to 0 03 mm in length and 0 016 to 0 017 mm in breadth are of a brownish or black colour, with a thin shell When mature

they exhibit a little lid, set within with a groove at the narrow end, while at the blunt end appears a tiny knob (Balz)

The development of the embryo proceeds within the worm, and cilia appear whilst the embryo is within the parent

PATHOLOGICAL ANATOMY.

The parasites in great numbers, it may be even in hundreds, are found in cyst like recesses or sinuses of the *walls of the largely dilated gall bladder and bile ducts* In size these cysts vary from a hazel nut to that of a walnut

The cysts are undoubtedly connected with the bile ducts, so that isolated worms are occasionally found free in them and in the duodenum In the

cling to the mucous membranes

und in great numbers not only in

bile ducts, but also in the upper

part of the

Miura found numerous submiliary miliary and somewhat larger prominences on the

GEOGRAPHICAL DISTRIBUTION AND ETIOLOGY.

China, Tonquin and *Japan* are the only countries in which the Distomum hepaticum has been met with

In Japan, according to Taylor, there are several narrowly circumscribed centres in which it appears endemically, namely, one in the vicinity of Okayama in the Bizen Ken, a second near Sendai, in the Miyege Ken, and a third in the Shinano province There are, moreover, one or two centres also in the provinces Higo and Hizen on the island of Kiushiu Probably the ailment is more widely distributed in Japan, for in Kioto I observed numerous liver ailments the nature of which could not be confirmed, and which probably may have been caused by this parasite

The principal centre in the Okayama province is situated on a strip of the coast which was recently reclaimed from the sea, and is principally used for the cultivation of rice Balz states that 20 per cent of the inhabitants, or even more, are affected by the parasite A dam protects

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from this canal is not used for drinking purposes, but for cleaning kitchen utensils and washing vegetables which are mostly consumed in a half cooked condition Moreover, the passing boats, with barrels containing excrement used for manuring the fields, pass along these waters Under such circumstances, Leuckart conjectures that the Distomum spathulatum

spends the first part of its life in some mollusc (perhaps a snail) inhabiting the canal water, and then either migrates into man's body direct with its host or leaves the latter while still immature, and only later after

The disease attacks all sexes ages and constitutions, without distinction, even little children are not spared It is not rare in one family to find parents and children simultaneously suffering from the disease

SYMPTOMATOLOGY

pressure There is often jaundice which is sometimes intermittent The spleen is as a rule distinctly enlarged

The general health and nutrition often remain fairly good for several years Bälz saw persons working in the fields although they had had the disease for six years Sooner or later, however, in spite of eating

stools average about twelve daily they occasionally, or may even constantly in some cases, contain blood As a rule there is no fever but the pulse often increases to 85—100 beats per minute During the further course of the disease ascites and dropsy in the legs appear, at first only intermittently and the patients becoming more and more enfeebled and cachectic finally succumb to general exhaustion

Leuckart draws attention to the fact that the symptoms of disease exhibited by patients afflicted with distomum spathulatum bear an unmistakable similarity to those of *dry rot* in horned cattle due to the distomum hepaticum though the course of the former disease is slower

In many cases the subjective and objective symptoms of the disease are very trifling or may even be entirely absent, so that the parasites are only incidentally found in small numbers in the dilated bile ducts It was this circumstance which led Bälz to differentiate a particular distomum innocuum

the parasites, but as symptoms of this kind were never observed in an of McConnell's cases, or in any of the numerous cases observed in Japan Macgregor's observations were no doubt due to an incidental complicatio (beri beri ?)

DIAGNOSIS

The diagnosis of the disease is founded on the *microscopical proof* c the characteristic *eggs* of the distomum in the intestinal evacuations c the patients

PROGNOSIS

The prognosis is *unfavourable* Hitherto no recovery from the diseas has ever been observed

TREATMENT.

The treatment is *symptomatic* The administration of anthelmintic are, in all cases, justifiable

[illegible]

blood [illegible]
had a [illegible]
pariab [illegible]
for [illegible]
question [illegible] ... eggs of distomum [illegible]

[illegible] 1900 [illegible] —4, p 355
[illegible] *der Leber* *Cbl* *f* [illegible]

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III.

BILHARZIA DISEASE.

SYNONYMS.

Bilharziose, Hématurie bilharzienne

HISTORY.

GEOGRAPHICAL DISTRIBUTION.

The geographical region of distribution of Bilharzial disease extends over a *large part of Africa* *Egypt*, particularly the basin of the lower Nile, forms the principal centre, from one third to one half of the native population (Fellahs and Copts) being said to be affected Bilharz and

is also endemic in the whole of East

of Good Hope, moreover, in Angola, in the Congo State (F Plehn only saw imported cases in Cameroon), on the Gold Coast, in Tunis and in Algiers, the presence of the parasite has been reported It probably also exists in many other parts of Africa where there is endemic hæmaturia, as in the Soudan, in the countries adjacent to the south eastern Sahara on the White Nile, in the neighbourhood of the lakes Albert and Nyassa, and in the basin of the Zambesi

The incidence of this disease is, however, not confined to Africa It has lately been found in Mauritius and in Syria (Wortabeh), in Mecca (Hatch, in Bombay, at all events often found the disease in Mohammedans, who, according to their account, had been infected in Mecca), in Mesopotamia (Sturrock), in Penang (Schön) and in Shanghai (Jedelius) Quite recently Walker[1] even saw a case in North America (Sparta, Illinois)[2]

[1] *Medical Record*, 1900 February 21

[2] In the province of Canton in China urinary calculi are remarkably frequent When I visited the hospital of the Medical Missionary Society in Canton Dr Kerr, who had

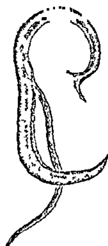


Fig. 24 — *Bilharzia hæmatobia*, male and female, the latter in the canalis gynæcophorus of the former, 10 times enlarged. After Leuckart.

and 0·5 mm. in breadth at the thickest part, and is of a dirty white colour. The anterior part of the body is tapered off and flattened, while the thick posterior part of the body has a cylindrical

mentous, and at the posterior part of a dark brownish, or even blackish, colour, this being caused by the contents of the intestine (see above). It lies in the canalis gynæcophorus of the male, with its head directed to the front, and as it usually is longer than the male its ends, more particularly the posterior end, protrude free beyond. Its sexual orifice is close behind the ventral sucker. The number of females found is always less than that of the males (Kartulis).

colour, slightly trans-

and a small spine,

side, and is some

to Leuckart, they

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HISTORY.

Distomum hæmatobium was discovered in Cairo by Bilharz in 1851, and recognised

GEOGRAPHICAL DISTRIBUTION.

The geographical region of distribution of Bilharzial disease extends over a *large part of Africa* Egypt, particularly the basin of the lower Nile, forms the principal centre, from one third to one half of the native population (Fellahs and Copts) being said to be affected Bilharz and Griesinger, in Cairo, found this p
Sonsino, in Cairo, and in other
parasite 42 times in 91 autopsie
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The *Bilharzia hæmatobia* (see fig 34) is a *trematode* with distinct es, and macroscopically very similar to a small round worm It ssesses two sucking discs on the front of the body, an oral and a ventral cker, the intestinal canal commences at the former and terminates at the latter The worm being hæmatophagous, the intestine frequently contains blood The *male*, ac cording to Leuckart, is 12 to 15 mm in length, and 0 5 mm in breadth at the thickest part, and is of a dirty white colour The anterior part of the body is tapered off and flattened, while the thick posterior part of the body has a cylindrical appearance with its edges curving inwards towards the abdomen whereby a groove or not quite closed tube—the canalis gynæcophorus—is formed, which serves for the reception of the thin female worm At the termination of this canal the sexual opening (without penis) is situated, the semen is discharged into the canal and is probably taken up by the sheath of the female through imbibition (Bonsino) The dorsal surface is provided with small spinous papillæ by means of which the males cling to the walls of the veins during their wanderings The *female*, according to Leuckart, is 16 to 20 mm in length, and about 0 2 mm in breadth, it is fila mentous and at the posterior part of a dark brown ish, or even blackish colour this being caused by the contents of the intestine (see above) It lies in the canalis gynæcophorus of the male, with its head directed to the front and as it usually is longer than the male its ends more particularly the posterior end, protrude free beyond The sexual orifice is close behind the ventral sucker The number of females found is always less than that of the males (Kartulis)



FIG 34 — *Bilharzia hæmatobia*, male and female the latter in the canalis gynæcophorus of the former 10 times en larged After Leuckart

The eggs (see fig 35) are oval, of a yellowish colour slightly trans parent, and provided with a thin shell without lid, and a small spine, which is mostly at the hinder end more rarely on one side, and is some times absent The size of the eggs varies According to Leuckart, they

officiated for many years as surgeon there informed me that he had had about 600 operations for stone in 1881 alone he had operated on 60 cases In most cases the calculi consisted of uric acid. In Canton a large part of the population live on the Pearl River, some on anchored boats some on houses erected on piles or rafts. The river water is used for cooking and drinking while excrement is deposited direct into the river Two thirds of here s stone patients were persons whose occupation brought them into close connection with the river boatmen representing the largest con tingent (see Carrow s Report in China Imp Mar Cust Med. Rep eighteenth issue 1880, and Report of the Medical Missionary Society in China for 1881) It therefore seems rational to connect stone disease with the river But in this connec ion I think less of the chalky constituents of the water which are often blamed as the cause of ur nary calculi than of a *parasite* that lives in the water and I consider it would be advisable to direct attention as to the occurrence of *distomum hæmatobium* in Canton

In Bangkok (Siam) the river Menam plays a similar part to that of the Pearl Rive in Canton and here likewise urinary calculi are frequent. Of this I was personall informed during my visit to the hospital by the native doctor who conducted it ar his information was subsequently confirmed by letter by Dr Rasch. In the Lac a according to the verbal information of the traveller Carl Bock stone complair ... particularly in Lampoon, a town situated on a tributary

III.

BILHARZIA DISEASE.

SYNONYMS.

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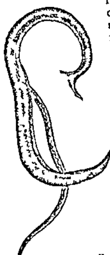


FIG 34 — *Bilharzia hæmatobia*, male and female the latter in the canalis gynæcophorus of the former, 10 times enlarged After Leuckart

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measure 0 12 mm to 0 04 mm (without the terminal spine, which measu 0 02 mm), according to Sonsino they measure 0 16 mm. to 0 06 mm according to Looss, who described the eggs as of a short spindle sha bigger in the centre and carrying a small *opaque point* at the poster end, the total length averages 0 197 mm, the greatest breadth 0 073 mm and the spine barely more than 0 0081 mm

The eggs passed by the patients in the urine often contain a full developed embryo ready to emerge Others are not transparent, a their contents having perished become calcified *According to Lort* and Vialleton the latter occ

The freed embryo has continually changes its sh an extended cylinder with possesses on its somewhat and is provided up to this point with a thick ciliated covering. Besid this, one may observe on the outer aspect of the body two transver rows of very delicate cones, th behind the centre of the bod body (Looss) orifice which embryonal stomach sac, containing numerous tiny, light refracting granules On either side of the sac a pea shaped formation is observed, which is considered b Railliet and Looss to be a single celled gland. Th posterior part of the body is crammed with numerous pal cells, which, according to Looss, are only germ cells highly developed vascular system and two pairs of ciliate funnels into which the former discharge, may, moreover



FIG 85—Eggs of *Bilharzia hæmatobia* *a*, with terminal process, *b*, with lateral process After Bilharz

and thither The after twenty four *unknown*

According to the analogy of other distoma is must be assumed that the embry enters some animal which inhabits water, where it is transformed into an embryoni chrysalis (redia, sporocysts) which begets in its interior a generation of immatur distoma, that these again become free, perhaps seek a second intermediary host

dent fies w th the sp nous glands of some immature d stoma the secretion of which exerc ses a soften ng influence on the skin of the larvæ of frogs and insects and also in the facts brought forward by Brock, which will be ment oned below

The life of the *worm* is probably a long one Sonsino mentions the

ETIOLOGY.

to as to the manner by wh ch nfect on occurs It

ted by ex rement E ropeans who only d nl

tret h while
e Egyptians
the bathing
ct must not
swallowing
water

According to Griesinger's observations in Egypt the months June to August yield the most numerous cases of B[illegible] from July to September) while fro[illegible] few cases Sonsino, however, could [illegible] found that season had no influence c[illegible]

The *period of incubation* in Bi[illegible] One of Hatch's patients in Bombay, who stayed in Suez for a fortnight was taken ill only four weeks after his return Brock, on the other hand, on the ground of his experience, states that incubation takes four months

PATHOLOGICAL ANATOMY.

The trunk of the *portal vein* with its tributary intestinal branches, and more especially the *venous plexuses of the urinary apparatus and rectum* are the particular *seat* of Bilharzia hæmatobia The worms are occasionally found free in the urinary passages

At the period of puberty the worms in pairs assisted by the locomotion of the male descend into the veins of the urinary bladder and rectum, there to deposit their eggs in large numbers this being the reason that the parasites are found most abundantly in the veins of the pelvic organs The number of worms found in a single person is occasionally very large in one case Kartulis found 300 The eggs deposited in the vessels cause engorgement of the small veins and capillaries which are finally torn or bored through by the spinous process of the eggs so that the latter are released into the surrounding tissue, where they agglomerate and form the point of departure of inflammatory changes Bilharz has suitably designated this condition *infarcimento bilharzico*, or *Bilharzial infarction* The degree of inflammation set up varies, and depends not only on the number of eggs and the duration of the disease, but on which organ or tissue is affected

The *urinary bladder* in the dead body is found to be affected most frequently and most severely In the milder cases the symptoms exhibited are those of a more or less intense catarrhal inflammation The mucous membrane in places is reddened, swollen and covered with a blood stained mucus containing numerous eggs, and here and there exhibits nodules caused by agglomerations of eggs which according to Sonsino commence as transparent or opaline blisters or papules not exceeding the size of a millet seed In far advanced cases, larger nodules or slightly raised lamellæ are found particularly on the posterior wall of

the bladder the lamella are of a round form and of a yellow brown or
or so hard that they crunch
and covered with sand l ke

somet mes qu te filled with excrescences In other cases on the contrary the bladder is d lated

ment oned accord ng to Go oriol 60 per cent of the cases are to be traced to B lharz al disease

Microscop cal i vestigation shows that the lamella and excrescences described above are mostly formed of the hypertrophied sub mucosa which like the mucosa is infiltrated with leucocytes wh ch occasionally l e so close together that unm stakable abscesses are formed enormous numbers of eggs also are depos ted which are partly calc fied and thus cause the hard consistency of the lamella The mucosa also contains numerous eggs wh ch however are not quite so plent ful as in the sub mucosa Rutimeyer also found eggs at isolated places close under the

may be trans er ed to the semen

In the *prostate* chron c inflammation is set up by the depos t of eggs th s part is therefore always enlarged attaining the size of an apple and

only affecting the mucous membrane, are met with

With Bilharzial disease as a basis *carcinoma* or other new formations often develop Kartulis compiled 300 cases, and found carcinoma ten times (nine times primary), once sarcoma of the bladder, three times carcinoma of the prostate (once primary) once fibro adenoma of the *prostate*, twice carcinoma of the seminal vesicles (secondary), and once carcinoma of the rectum (primary)

nor sugar but was not examined microscopically Kartulis is of opinion that in this case the transmission of the parasites had taken place *directly through the skin*.

Besides the organs already mentioned, the presence of eggs has been seen in extravasation of blood, and in the enlarged *mesenteric glands*, they have likewise been found in the *lungs* with small interstitial infiltrations, in the *liver* with slight cirrhotic changes, and in the *cutis* Gautrelet found the eggs in a *gall stone*, which a woman passed who had previously lived in Egypt twenty years Greisinger in one case observed three egg shells in the *blood of the left ventricle* The eggs hitherto have not been found in the spleen or pancreas (Kartulis)

Angelica G Panagiotatos[1] in one case observed *pleurisy with chylous effusion*, and at the autopsy found the pleura thickened opaque and with dilated vessels and polypoid proliferations which in microscopical sections, showed eggs in various stages of development

The transmission of the eggs from the usual seat of the parasites to *distant parts of* the body takes place partly through the venous blood (to the lungs through the anastomoses between the venous net work of the urinary blood with the vena hypogastrica and vena cava inferior), and partly with the assistance of their spinous process and the influence of external pressure (into the left ventricle from the lung)

Kartulis is of opinion that the eggs are not transported to distant parts of the body through the current of the blood, but are directly deposited in the organs in which they are found

SYMPTOMATOLOGY.

Hæmaturia is the principal symptom of Bilharzial disease, it appears ... In mild cases only the ... of pure ... racting ... atients ... only a ... when passing urine

[1] *Janus*, 1900-1, v, p 51

If the urine is allowed to stand, the flocculent blood tinged mucus settles at the bottom of the vessel, while in other respects the urine is quite normal On microscopically examining the sediment there will be found besides red and white blood corpuscles and epithelium, the eggs described above and empty egg shells, with these there is at times crystals of uric acid, urate of ammonia, oxalate of lime and triple phosphates Sometimes the patients evacuate the eggs in hundreds and thousands

is sometimes observed after bodily

railway travelling) and excesses in

patients complain of pressure and severe burning pains which may radiate to the perinæum, the anus, the abdomen and the lumbar region, the abdomen and lumbar regions may also be painful on pressure The urine assumes a more uniform sanguineous colouring, loses its normal consistency, becomes alkaline and opaque, and deposits a more or less plentiful sediment of blood Owing to the formation of coagula the urethra may be obstructed, and transient dysuria and ischuria may occur in consequence Occasionally, also, paroxysms of pain obtain which are very similar to renal colic, and are caused by the passage of blood clots through the ureters

In severe cases the hæmaturia and cystitis increase, and in consequence of the latter condition *gravel* and *urinary calculi* form The pains become more severe, the urine is still further mixed with pus, and spasm of the bladder, dysuria and ischuria, set in Renal colic is also observed Perhaps even more frequently than stone in the bladder *urinary fistulæ* occur According to Trekaki and v Eichstorff, these are present in 40 per cent of the cases, and arise from peri urethral inflammation and subsequent a

most ordinar

more rarely

the thigh and

causes violent strangury and painful urination Enlargement of the prostate is frequently to be made out by rectal examination

When the disease has its seat in the *female genitals*, a sanguineous discharge containing ova is often observed

When the *rectum* is affected a further group of symptoms is added to the category of the disease At first they simulate hæmorrhoidal disorders, and consist of loss of blood, particularly towards the end of

for years, without causing any deterioration of the general condition of the patients, who may live to a great age. When the parasites die off or

such cases gravel and urinary calculi may form (Sonsino). In serious cases, in consequence of the continuous loss of blood, disorders of the rectum, anæmia, weakness and emaciation may gradually ensue, and the patient may finally die of general exhaustion, or death may ensue in consequence of uræmic or pyæmic conditions, or in chronic disease of the bladder.

Exceptionally, Bilharzial disease may run an acute course, causing death in a short time. Griesinger mentions two cases which terminated fatally after the short duration of an obscure disease, in which the autopsy revealed nothing beyond fresh Bilharzial disease, with catarrh of the bladder and renal tracts and diffuse hyperæmia of the kidneys.

DIAGNOSIS

The diagnosis of Bilharzial disease is founded upon *microscopical proof of the presence of the eggs* in the urine, the stools, the semen, &c. The eggs are so characteristic that it is hardly possible to confuse them with those of any other of the parasites of man.

When the *rectum* is diseased the diagnosis may be assured by the excision and microscopical examination of the rectal excrescences. The presence of vesical calculi is confirmed by examination with sounds; care must, however, be exercised not to mistake the hard, rounded lamellæ with their sandy coatings occurring on the mucous membrane of the bladder for calculi.

PROGNOSIS.

Though Bilharzial disease often only originates trifling disorders, which may heal spontaneously, it must nevertheless be regarded as a serious ailment, *as in many cases death is due, not so much to the disease itself*, but to the disturbances it brings in its train. Patients suffering from this disease are therefore not accepted by the life insurance companies (Brock). The disease does not occur with equal severity in different countries; in Cape Colony it is less serious than in Egypt, because in the latter country the possibility of a fresh infection is more likely than in the Cape.

PROPHYLAXIS.

So long as the history of the development of Bilharzia is unknown, and we are not aware for certain in what way the worm invades the human body, so long must the
measures to be adopted
the brood of immature
through drinking impure
it is urgently necessary
drinking water—only to drink doubtful water after filtering or boiling it,

disease

In any case however Looss s suggestion should be adopted that to

embryos are unable to escape and develop further

TREATMENT

The treatment of Bilharzia disease is mostly *symptomat c* Hitherto we have become acquainted wit
able to expel or kill the parasites
sheltered position quite apart fr
by the parasites would not be
The local application of strong *anthelmintics* in the form of injections into the bladder is to be strenuously avoided [1] as they are not only useless—it being impossible thus to affect a parasite the principal seat of which is in the portal vein—but are also capable of causing severe cystitis The same

terebinth 10 0 extr filicis chloroform, āā gtts v, mucil tragacanth 60 0, every morning)

The favourable effect of a *change of climate* is much recommended but the only object attained is that thereby the possibility of new infections are avoided

are a so recommended

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[1] Allen advises inject ons of saturated alcoholic solutions of santonin and Harley injections of extract of male fern

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IV

THE MEDINA WORM. (DRACONTIASIS.)

SYNONYMS

The parasite originating this disease is known by several names, of [illegible]

HISTORY.

The history of the Medina worm disease extends back to quite remote

found in Plutarch, who, on the grounds of a communication made by Agatharchides of Knidos a tutor of Ptolemæus Alexander (about 150 B C), relates "that the people by the Red Sea suffered from a severe disease, in which small snakes—δρακόντια μικρά—came out of the skin and gnawed [illegible]

Die Heilkunde der alten Aegypter nach dem Papyrus Ebers. Verh des x inter med Kongr, Berlin, 1890 vol. v, 16 abt p 40

GEOGRAPHICAL DISTRIBUTION.

The guinea worm disease is met with almost exclusively in *tropical regions*, and especially the Eastern hemisphere, in countries where it prevails, however, it is confined to *narrowly circumscribed* districts

The *West Coast of Africa* from Senegal to Cape Lopez, is one of the principal centres and there a few localities in the Gold Coast and Slave Coast are most pronouncedly visited On the Slave Coast indeed, according to Siciliano almost half the population are said to be afflicted with the parasite The disease moreover, is endemic in the *Soudan* (Suard), in *Darfur Cordofan Nubia*, in lower Egypt the cases observed are imported from the Soudan and the *Coast of Abyssinia*

In *Asia* the regions of distribution of *dracontiasis* are isolated spots along the coasts of *Hedschas* (Medina) and *Jemen Arabia Petræa, Syria* (Bay of Scanderoon) the *coasts of the Persian Gulf* and of the *Caspian Sea*, a few districts of *Turkestan* (Chiwa, Buchara, Kokan) also in *the Sir Darja* (Kirgis steppe), and in *British India*, where the disease is

natives

The disease has been carried to *America*—to Guiana Brazil, and the Antilles—by negroes from the West Coast of Africa but has again disappeared since the importation of negroes has ceased It has, however,

still

NATURAL HISTORY.

, filamentous, end, which in form and appearance resembles a violin string its length, according to Leuckart, averages from 60—80 cm , and its breadth 0 5—1 7 mm , in Africa, however, far larger specimens are observed, 6 feet and more in length, so that Manson is inclined to the opinion that it is a question of not one but of several species of worms The outer covering of the worm consists of a firm but very elastic cuticle , it is said, indeed, to be so elastic that one may stretch it to more than double its original length Perhaps this may be one reason why the statements as to the length of

ventral edges of the oral aperture a small papilla rises and six smaller ones are observed in the circumference of the shield These papillæ are

[1] Wratsch, 1896 No 3, Ref Cbl f Chir, 1896, No 21

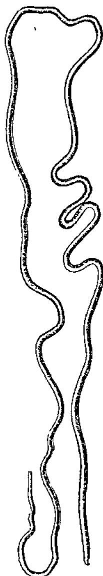


FIG 36 —Guinea worm. After Leuckart.

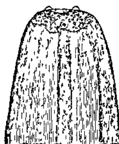


FIG 37. —Head end of the Guinea Worm After Leuckart.



FIG 38 —Transverse section of the Guinea Worm 5 cm from the head end After Leuckart. *u*, uterus with embryos, *ι*, intestinal canal; *o*, ovary

considered to be organs of sense The caudal extremity is short and curved in ventrally The straight intestinal tract commences at the oral aperture, runs through the entire length of the worm, and terminates blindly near the tail The principal bulk of the body is occupied by a hugely developed uterus in the form of a straight canal, entirely filled with embryos, the number of which is computed at from eight to ten millions (see fig 38) A small shrunken ovary is situated at either end of the uterus, neither vulva nor vagina is to be seen

The *male* has hitherto only been observed once In dissecting a body in Lahore Charles discovered two female guinea worms in the subperitoneal tissue, to each a smaller worm, about 4 cm in length, was attached with its posterior end at a spot about 14 cm distant from

muscles (especially of the lower limbs) is the principal *seat* of the guinea worm Immature worms are also incidentally found in the subperitoneal tissue

The guinea worm also infests animals such as the ox, horse dog leopard, jackal, canis lupaster, &c

It has hitherto been believed that no genital pore was present in the adult worm and that the embryos were released through the rupture had left or been removed from its host monstrated that this view is erroneous *the embryos* takes place in the following manner —when the embryos have become mature the worm bores a hole in the deeper layers of the skin, without however, perforating the epidermis In consequence of the inflammation caused by the process or, it may be, through the ejaculation of an irritative secretion, a vesicle forms on the spot in question The contents of the vesicle become opaque, and it bursts in a few days, and a round erosion or ulceration, the centre of which is cavernous, ensues

The head of the worm is not immediately visible in the orifice, and days or even weeks may pass before it is protruded If a little cold water is dripped on the skin near the ulceration, a drop of liquid, which is at first clear but which afterwards becomes grey and viscid, is exuded and ... to contain an enormous number of embryos If the experiment be

comes opaque and milky white After a few seconds ... its contents consisting of embryos, are evacuated whereupon the rod contracts This, according to Manson ensues because, in consequence of the contraction of the

longer than it is subsequently, ... diverse statements as to the length of the worm Manson's observations coincide in the essential points with those of Forbes made sixty years previously

The *embryos*, without decidua (see fig 38, p 381), are not cylindrical

to Bastian terminated in a slit shaped anus, and they have two small sacci form organs that open into the part at the commencement of the tail

The embryos can live in water for six days, and much longer, at least fifteen to twenty days in dirty water or moist earth (Manson) If [illegible] be brought to life again by being [illegible]

[illegible] ertaken by Fedschenko at the instigation of Leuckart, and which have lately been confirmed by Manson, the embryos that have become free and reach the water insinuate themselves into the abdominal cavity of a certain *fresh water cyclops* (*cyclops quadricornis*), and after being here provided with a cutis they grow into *larvæ*, 1—1 5 mm in length The further history of development of the guinea worm has not been hitherto discovered Experimental feedings conducted by Fedschenko on cats and dogs with infected cyclops were futile Probably the larvæ, with their intermediary hosts, are introduced into the stomach of human beings in drinking water and there become free In this position they probably also attain puberty and copulate. The males then die off and are evacuated with the fæces, while the females begin to travel, and at last reach the subcutaneous tissue (Fedschenko)

[illegible]

ETIOLOGY.

The disease is probably acquired by drinking *polluted water—i e*, water containing the intermediate host of the parasite which is infested by the larvæ

There are a number of recorded cases which undoubtedly confirm this method of infection, and of these I cite a few from Hirsch s work

[illegible]

According to another view, the worms in an adolescent state invade human beings while they bathe or while standing in water working, or wading through ditches, &c, by penetrating *through the pores of the skin*

(sweat glands) into the subcutaneous cellular tissue This opinion is

each parasite has its seat by pref ... s far removed from the place of ... the liver, the cysticercus in the ... the muscles, &c

The opinion that the parasites invade the body by means of the skin is more strongly supported by Harington's observations This author observed the disease on the backs and loins of water carriers where the leather water sack comes in contact with the body (in one case thirteen parasites), on the head and neck of one man who was in the habit of carrying water in a clay pitcher on his head, and in the loins of a man ... who ... ally, ... the disease, may be as long as two years.

The *guinea worm* occurs in all *races* and *nationalities*, all *occupations* and *ages*, and in the male as well as in the female *sex*

If it appears more frequently in negroes and other natives than in Europeans, and in labourers, private soldiers, &c, more frequently than in persons living under more favourable conditions, and in the male sex

years According to Ewart, on the other hand, the frequency of the disease is in direct ratio to the quantity of rain that has fallen in the previous year, dry and hot weather particularly favouring the infection

The geological character of the soil appears to exercise no influence on the occurrence of the disease In former years it was sought to connect it with volcanic soil

SYMPTOMATOLOGY.

The signs and symptoms which the Medina worm generates are usually very simple, being merely those of a local *boil like inflammation* on the skin

It is seldom that the wanderings of the worm cause any sensation

to that of an egg, appears on the affected limb and prevents its use. The growth of the swelling is
aches, abdominal pains
bearable sensation of ir
delirium and convulsions
its size—and more esp
pressure on the under lying blood vessels—stasis and œdema may set in A vesicle soon forms on the swelling and it contains a liquid which at first is clear, but later on becomes opaque and purulent After a few days the vesicle bursts, so that a round ulceration with a central aperture ensues,

abscesses appear, from which, after opening, a young coiled up worm is evacuated

When the anterior part is extruding from the aperture it is generally

these cases severe symptoms of inflammation are set up which, under some circumstances, lead to deep seated inflammation, periostitis of those

rare instances the arms, trunk, scrotum, penis, head, neck, conjunctivæ, orbit, nose, lips, and sub lingual regions become the seat of the parasite

become absorbed.

It is seldom that more than one worm is present in the body, occasionally, however, two three, ten, or even more, may be present Pouppee Desportes observed fifty worms in one case

DIAGNOSIS.

The diagnosis of dracontiasis, when the worm has caused ulceration and a fistulous tract, is usually quite easy

PROGNOSIS.

The prognosis of the disease is favourable as a rule

PROPHYLAXIS

In districts where the Guinea worm is endemic, the *use of boiled or carefully filtered water* is the one essential preventive measure Moreover

TREATMENT.

hitherto has been the usual
f the dangers arising from
comes out spontaneously
that careful attempts at
extraction are permissible The emptiness of the uterus may be recognised by the shrivelling of the worm, and by the fact that Manson s experiment (p 382) is no longer successful In order to accelerate the evacuation of the uterus, Manson recommends that the legs be irrigated with cold water two or three times a day, or that the patient be ordered to take frequent cold baths In the intervals simple water compresses should be applied After the removal of the worm the ulcer should be *dressed antiseptically*

accelerated

Various methods of killing the parasites *by internal or external means*, in order to accelerate and ease its expulsion, have also been advised

Fisch advises *inunction* with unguentum hydrargyri

the fistulous apertur
following day

The favourable effect of injections of sublimate have been fully confirmed Foulkes advises injections into the worm of *alcohol* coloured by fuchsin, the idea being to harden it and thus facilitate its extraction The addition of the fuchsin serves to show how far the worm is injected and hardened Tufnel advises that cotton wool, steeped in *pure carbolic acid*, be pushed into the sinus with a probe, or that a probe covered with carbolic oil be introduced Roth advises that the sinus be split on a grooved director and then bandaged with lint dipped in carbolic acid (1 15) The bandages should be renewed every twenty four hours After the second or third bandage the worm, as a rule comes out Finally, Faulkner states that he has drawn out the worm within an hour by the application of the *constant current* (direct contact with one pole of the battery)

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V.

FILARIAL DISEASE.

DEFINITION.

A GROUP of endemic and seemingly heterogeneous diseases occurring in tropical and sub tropical countries are comprehended under the term ... Krankheit, *filariasis, filariose, maladies filariennes*) ... and are attributable to the ...

HISTORY.

... the hydrocele ... discoveries ... least, very ... description ... n trans ... se Greek ... on in the ... Chapotin ... in Amoy ... rias in the ... ant

GEOGRAPHICAL DISTRIBUTION.

(SEE MAP IV)

... and

notwithstanding similar conditions of the soil, are quite, or almost entirely, exempt

The following places are known as the geographical region of distribution of filarial disease *India* and *Further India*, *Ceylon*, *the Malay Archipelago*, *China*, especially the southern and south eastern coast ports, *Japan*, particularly the most southern of the four great Japanese islands Kiushiu, and the neighbouring smaller islands, such as the Goto Isles, Hirado shima Amakusa, &c. In the following places filarial infection is

affected The Island Huahine, one of the Friendly Islands group, seems to be the most severely afflicted region known, for, according to Saville, seven tenths of the male adult inhabitants suffer from elephantiasis

SYMPTOMATOLOGY.

The various forms in which filariasis declares itself are—

I. Hæmato-Chyluria.

Hæmato chyluria occurs as a rule intermittently The paroxysms may be repeated throughout several weeks or months *Intervals* of

urine mostly exhibits a peach coloured tint and is not transparent If allowed to subside the blood sinks to the bottom, frequently as coagula and the supernatant urine is opaque white with a yellowish tinge, rather like diluted milk Occasionally a distinctly cream like layer is also deposited In other cases especially in the later periods of the attacks, the evidence of blood is absent and the urine throughout is milky and uniform but sometimes whitish sometimes jelly like coagula form in it or all the urine coagulates to one loose mass, taking the shape of the utensil

Sometimes there is formation of thrombi within the bladder itself, the consequence being temporary retention of urine which persists until the clots have passed through the urethra a process that causes the patient severe pain

If the chylous urine be shaken up with ether after the addition of a little solution of caustic soda it loses its milky appearance, the fat suspended in it becomes dissolved but the urine does not generally clear

cholester n and lecithin Albumen is always present but in variable quantities In this particular case the quantity averaged from 0·6 to 2 6 per cent Like other observers I could never demonstrate either peptones or sugar

The microscopic examination of the urine shows the presence of delicate, dust like particles of fat If the fatty elements are in larger quantity the particles of fat are likewise larger Red and white blood corpuscles are

[1] *Philos Transactions* 1849 p 81
[2] Physiologische Chemie 1881 p 595
[3] v Gorup Besanez Handb der phys Chemie, 2nd edition 1867 p 370.

also found in variable quantity, and frequently but not constantly, the *embryos* of *filariæ*, to be described below. In uncomplicated cases urinary casts are never observed.

The re action of chylous urine is usually faintly acid. The specific gravity is sometimes increased, sometimes diminished, being mostly decreased when it contains much fat. The quantity of urine passed in twenty four hours does not generally deviate essentially from the normal.

The quantity of blood and fat in the urine varies not only on different days, but at different times of the same day. At one time the urine passed early in the morning is richest in blood and contains the most numerous filariæ, at another time this condition is exhibited in the urine passed later on in the day. The afternoon urine is usually the most chylous, whereas the urine passed in the morning and at night shows the smallest quantity of fat. Bodily movements and meals cause the admixture of abnormal constituents to be increased. If much fat is partaken of, the urine exhibits more fatty ingredients. After repeated aperients Lancereaux observed that the chyle in the urine almost disappeared.

Towards the termination of the attacks the urine generally regains its normal condition, but traces of albumen are often left after apparent recovery.

Occasionally the hæmato chyluria does not set in paroxysmally, but runs a continuous course. I saw one patient who had been uninterruptedly affected for two years.

The disease may extend over many years without essentially weakening the constitution. The patients may attain a great age and then succumb to another disease. In other cases, on the contrary, anæmia and emaciation gradually set in, and the sufferers often perish after exhausting diarrhœa has appeared as a concomitant.

Hæmato chyluria is observed more frequently in the *coloured races* than in whites, the former being less careful in their choice of drinking water than the latter; it is especially a disease of *middle age*. According to Lewis, *women* are more frequently attacked by the disease than men, and Manson also is of opinion that the female sex is the more liable.

In women pregnancy and parturition are *predisposing causes*, and in men running and jumping.

On the Friendly Islands the *chiefs* according to Thorpe are *more rarely* attacked by filariasis than the lower classes, being much more careful in their choice of drinking water. The drinks in these islands consist of cocoanut milk and kava (the juice of the chewed roots of piper methysticum mixed with water).

2. Elephantiasis Arabum

Elephantiasis consists principally of hypertrophy of the cutis and

are observed (Daniels). The upper limbs are more [illegible]

In exceptional cases other parts of the body, such as the mamma, ear

[1] Derived from βου [illegible] = (in compounds) large, monstrous, and χελύνη = leg.

Accord ng to Manson it is remarkable that in the *South Sea Islands* the *arms* and *breasts* most frequently become attacked

The disease mostly if not always develops with symptoms of *lymphangitis* which accompanied by fever return at irregular intervals of weeks, months or years

The attacks usually commence with severe rigors followed by high fever with head ache prostration thirst vomiting and delirium The

repeated several times At times an abscess forms or the diseased parts become gangrenous and death may even result in consequence of blood poisoning

Attacks of fever of this kind (elephantoid fever filarial fever) which

pointed or sharp stones the thorns of plants &c

Perhaps the severe *forms of erysipelas* mentioned above as occurring in Brazil and Réunion may at least in some instances be due to filarial disease

swelling of the skin decreases
t behind The skin gradually
Its surface is either smooth

what diminished.

3 Lymph [illegible]

they may be absent from the blood Manson once found *eggs* in the fluid of the discharge

The scrotum feels soft, with a jelly like elasticity, it is sometimes smooth, but more often wrinkled, and on incision it is observed that the tissue is interspersed with spaces and recesses filled with lymph The testicles may be enlarged, and hydrocele of one or both sides may be present The groin glands, as a rule, are enlarged

Lymph scrotum is frequently combined with elephantiasis scroti, in ...me way that an elephantoid leg may be occasionally accompanied ...phorrhagia

...e disorders of the patients partly depend on the weight of the ... and partly on the drain on the system due to the quantity of ...creted

4. Varicose Groin Glands.

... groin glands are observed more frequently in men than in ... may occur in addition to the other forms of filarial disease, ...y be the only evidence of filarial infection Varicose groin ...distinguished by a bulging, soft, doughy, half fluctuating ...as large as a fist in which hard nodules may be felt here and ... over which the skin is unchanged The swelling may occa... ...be removed by pressure, but it returns as soon as this is relaxed ...According to Manson, a *femoral* and *inguinal* enlargement may be ...differentiated The former is situated in the region of the cribriform

inguinal or femoral alone affected

Occasionally varicose, dilated, lymphatic vessels are found in the vicinity, and these occasionally reach as low down as the popliteal space, in such cases lymphorrhagia is frequently observed (Mazae Azéma) The lymph vessels of the vas deferens may also become varicose

Clear, milky, or sanguineous fluid may be drawn off from the varicose lymph glands by means of a Pravaz's syringe, this fluid under the microscope almost always exhibits filaria embryos and, in rare cases, ova The groin glands on both sides are usually affected, and except during the periodical attacks of lymphangitis, they are not painful, but after long-standing severe bodily exertion, especially during very hot weather, the glands enlarge, and cause a strained or dragging sensation In women the glands become enlarged during menstruation and pregnancy (Mazaé Azéma)

Should elephantiasis follow, the soft swelling is transformed into a hard tense mass

In rare cases other lymphatic glands, particularly the axillary glands, may become similarly diseased Bancroft designated the varicose groin and axillary glands *helminthoma elastica*

5. Rarer forms of Filarial Disease.

Lymphatic varix, without the accompaniment of varicose lymphatic glands, are occasionally found on various parts of the body, such as the

abdomen, legs, arms, &c *Varices of the lymphatic vessels of the vas deferens* likewise occur alone The latter have some similarity to varicocele but are differentiated from this by their feeling softer and by the dilatation of the lymphatic vessels being more unequal than that of the veins

A form of *orchitis* occurring in some filaria countries also appertains to filarial disease It commences suddenly with symptoms of fever of the character described above The testicle accompanied by severe pain swells quickly to three or four times its original size The epididymis and the vas deferens participate in the inflammation, and a clear or milky effusion is discharged into the tunica vaginalis Sometimes also, the

are repeated at longer or shorter intervals, and are at times accompanied by other filarial symptoms

A form of *chylocele* occurring endemically is to be classed with these forms of filariasis It either develops gradually or is an outcome of the orchitis described above The chylocele seldom attains a large size According to Magalhães it is as a rule, least tense early in the morning and seldom attains the tension presented by the ordinary serous hydrocele

...hat it is not translucent or pale red appearance, ...n enormous number of ...ae present is far greater than in the lymph obtained from varicose ... glands or lymph scrotum

Filarial disease may perhaps also contribute to the formation of *chylous ascites* Many observers, amongst them Manson are of opinion ... cording ... worms ... more ... endemic occurrence of chylous ascites from the countries where filarial disease is endemic

... in Surinam

normal the blood was not examined ... removal of nineteen pints of similar fluid. No autopsy was made

When sanguineous and chylous material are present in the stools it is possible that the accompanying *diarrhœa has some relation to* filarial diseases

deep are by no means of rare occurrence Although such abscesses may be the result of ordinary inflammatory processes, they sometimes seem to be directly induced by the parasites, for filariæ have repeatedly been found

in the pus of such abscesses Occasionally they exhibit a tendency to bleed (Kennard) If they are situated in the thoracic or abdominal cavity they may lead to serious disturbances Manson is of opinion that the abscesses in many cases are as in Guinea worm, caused through the irritation of dead parent worms

Maitland also instances *acute synovitis* as a not infrequent complication of filariasis in his cases only the knee joint was affected.

The separate forms of filarial disease may occur in one individual Thus it is not uncommon to observe patients who are simultaneously afflicted with hæmato chyluria and lymph scrotum others with lymph scrotum and elephantiasis of the leg others still with chylocele and varicose groin glands &c

In conclusion it must be mentioned that filaria embryos are frequently found in the blood of persons who are quite healthy and exhibit none of the affections described and who are suffering from no other complaint. Da Silva Lima found that of twenty six persons examined who had filaria embryos in the blood twenty one were free from any clinical signs or symptoms of the infection

NATURAL HISTORY OF THE FILARIA BANCROFTI AND PATHOLOGICAL ANATOMY

The *adult filaria parasite* which belongs to the *nematodes* was first discovered in Brisbane (Australia) by Bancroft in 1876 in a lymphatic abscess on the arm of a patient Cobbold out of compliment to the discoverer, gave the parasite the name of *filaria Bancrofti*

The *female* (fig 41) which at first alone was known is a filamentous white worm 85 to 95 mm in length and of the thickness of a human hair The head has a round unprotected oral orifice The neck is thin one-third the thickness of the body The tail has a stumpy termination The anal aperture is at the tip of the tail and the sexual opening near the head A simple digestive tract extends from the mouth to the anus The rest of the body is taken up by the sexual organs The uterine tubes are crammed with myriads of ova in all stages of development which are 0 016 to 0 026 mm in diameter According to Manson the filarial worm normally is viviparous but it happens that the eggs are prematurely deposited so that it becomes oviparous Manson twice found ova in the lymph once in a case in which the lymph came from varicose groin glands and in another case from a lymph scrotum

The *male* is shorter and thinner than the female Daniels gives its length as 44 mm Its caudal end according to Manson is strongly curved and possesses two uneven spicula of which the longer has its free end turned backwards forming a hook similar to the handle of a walking stick whereas the end of the shorter one is direct towards the orifice of the cloaca Pre anal papillæ are absent but three rudimentary pairs of post anal papillæ can be distinguished

The males and females are generally found together,

41 —F laria
fti female
size After

abdomen, legs, arms, &c *Varices of the lymphatic vessels of the vas deferens* likewise occur alone The latter have some similarity to varicocele but are differentiated from this by their feeling softer and by the dilatation of the lymphatic vessels being more unequal than that of the veins

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subsides If the effusion into the tunica vaginalis is clear, absorption of the fluid usually takes place A chylous effusion on the other hand, is not usually reabsorbed, but develops into a chylocele Attacks of this kind are repeated at longer or shorter intervals, and are at times accompanied by other filarial symptoms

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s far greater
h scrotum
rmation of
of opinion
According

to my opinion however, this view is erroneous, for the round worms found in Winckel s case differed considerably from filaria embryos, moreover, according to my information, there are no reports as to the endemic occurrence of chylous ascites from the countries where filarial disease is endemic

Winckel s case related to a missionary 30 years of age who had lived in Surinam

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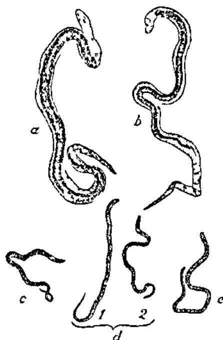
41 —Filaria ... female ... size After

The males and females are generally found together

probably copulating Occasionally the parasites are present in great numbers

The embryos (fig 42) which are found in the blood, urine, &c, are del cate [illegible]

perceived For further details of the more minute structures, see below, p 399 The embryos are enveloped in an exceedingly thin structureless sheath which closely envelops the greater part of the body, but which extends beyond the head of the parasite and particularly beyond the tail, where it sometimes appears in the form of a delicate flagellum and sometimes as a bag like projection Within this sheath, which is probably an embryonic integument the embryos are observed to project themselves backwards and forwards The movements are continuous and serpentine and the tail whips about lustily amongst the blood corpuscles In preparations protected from desiccation the embryos may remain alive for days They usually die in an extended or half bent attitude After death they become more granular in appearance As their size varies considerably, the statements of the different observers as to their dimensions do not coincide entirely Lewis gives the length of the embryos as 0 34—0 37 mm and their breadth as 0 007—0 008 mm Crevaux states that their length is 0 265 mm and their breadth 0 010 mm I found them on an average 0 216 mm in length and 0 004 mm in breadth therefore nearly corresponding to the diameter of a red blood corpuscle so that they are able to pass through the capillaries unchecked



e Filaria perstans

The number of filarial embryos present in specimens of blood, urine &c varies extraordinarily Sometimes a number of preparations have to be examined before one embryo is discovered In other cases they are so numerous in one drop of blood that supposing the proportionate number were equally distributed in the body the total would amount to millions Mackenzie computed their number in one case to be from thirty six to forty millions

If the number of embryos is very few in the urine or the chylous fluid it is advisable to *filter* the excretions and to use the coagulum or drops of thick fluid remaining on the filter for examination.

In order to preserve permanent preparat ons in wh ch the *sheath* may become vis ble the process is as follows The blood wh ch should be spread on the sl de in a very th n layer should be dr ed over strong acetic ac d the slides w th blood smear downwards

through o l of cloves and mounted n Canada balsam By this method the embryos are stained blue and the r sheaths pale red.

Interesting observations on the further development of filaria embryos have been published by Manson and Bancroft The embryos do not grow to adult worms in the human body but must leave it to develop

Mosquitoes

the inter

utensils in

The female mosquitoes—for the males have no sting and do not live on blood—suck filaria embryos into their stomachs with the blood of filaria patients and in this situat on the embryos are found relatively in larger numbers than in the blood of patients The mosquito sting therefore on account of its structure must be peculiarly adapted to draw the filaria embryos from the capillaries as with their sheaths they

here with n two or three weeks and after several metamorphoses are transformed to an actively mobile worm 1 63 mm in length and 0 031 in breadth

Th e worms are provided w th a

sucked filarial blood some time before the actual observation, and this view is strengthened by the fact that Manson in his mosquitoes found filariæ in various stages of development, which Bancroft did not

There are at present no positive observations as to the further fate of the filaria larvæ

The impregnated and satiated female mosquitoes betake themselves to the nearest stagnant pool, and there deposit their eggs and die According to Manson's opinion the filaria larvæ then become free, and if the water is used for drinking purposes, they are thus taken into the human stomach, through the walls of which they bore and wander about in the body of their host till they have found a suitable seat They there attain puberty and multiply by means of sexual generation

Bancroft, who found that the larvæ could not live in water, but die in it after three or four days, does not therefore coincide in the view that

the hand, when portions of them may adhere to the fingers, which may subsequently be put to the mouth Bancroft also considers that transmission is possible through the bite of filariated mosquitoes

The latter inference finds a support in Low's latest investigations,[1] undertaken under Manson's directions Low examined mosquitoes infected with filariæ and

i water to
ited their

Manson's and *Bancroft's* observations *find analogies in the meta*morphoses gone through by the filaria medinensis in fresh water cyclops
and a species of tick
lopted the opinion of
it of the filaria san
guinis hominis, whereas Leuckart's opinion ... somewhat, inasmuch as he believes that mosquitoes are not the only creatures in which the parasites find the conditions necessary for their metamorphosis It seems
small water animal may
, and these may transmit

A long period often elapses between the invasion of the parasites in man and the first appearance of the disease It has been repeatedly observed that the complaint breaks out in people, who have formerly dwelt in the tropics only several years after they have returned to Europe *The reason for this lies either in* the circumstance that the filaria per chance require years to attain complete development, or that in such cases they at first are situated where they are harmless to the human organism, and only reach more dangerous localities after manifold

e of filariæ at some years, that of

[1] *Brit Med Journal*, 1900 June 16, p 1456.

They have been met with in (lymph) abscesses, in one case Lewis discovered them in the blood clot obtained after incision of an elephantiasis scroti Hillis found them in the urine of a man suffering from hæmato chyluria, in this case the urine previously had contained neither embryos nor eggs

Czerny found a female filaria in the slightly enlarged *ovary* of a woman 40 years of age (Brazil), this fact has also been noted by Thiesing

Most probably the *lymphatic system* is as a rule the seat of filaria Bancrofti, and it is particularly the *larger lymphatic trunks* which they choose for their abode The large lymphatic trunks become more or less obstructed, partly by the parasites themselves, partly by the coagulation of the lymph that takes place around the worms, and in consequence of the chronic inflammation of the lymphatic vessels set up by the continuous irritation In consequence, an engorgement of the peripheral

thoracic duct or in one of its affluents, or in the tissues surrounding the abdominal aorta Into this is discharged, not only the lacteal vessels of the intestine, but, amongst others, the lymph vessels of the urinary apparatus If the parasites cause an obstruction in the places mentioned, an engorgement is set up in all these vessels, and the lymph which seeks to attain the blood by collateral tracts has to take a retrograde current in the dilated vessels The degree of engorgement depends on the elasticity of the collateral vessels If the engorgement is great the stretched vessels may at last burst If this occurs in any spot in the urinary

ed with the urine and chyluria

l below, Havelburg was able to

of chyle with urine took place

ges burst, the blood vessels may

decreases, the dilatation of the vessels is less, and in consequence the torn vessels are finally closed The abnormal discharges then cease When, however, the collateral passage cannot battle with the quantity of

[1] Manson does not attribute the sanguineous admixture of the urine to the blood vessels being torn, but to the circumstance that the lymph so long retained in the varicose lymph passages transforms white blood corpuscles into red

The seat of filaria Bancrofti in hæmato chyluria has not yet been estab lished by *post mortem* examination To my knowledge there are on

vessels, however, presented the changes described above.

evacuated by this means exhibited quite a normal appearance.

In a case of Mackenzie's observed in London, the patient, who was a European, born in India and 25 years of age, died ten months after the appearance of the chyluria

colour, and exhibited dilated lymphatic vessels on the incised surfaces dilated vessels could be discovered in the urinary apparatus

In *elephantiasis* of the legs and of the scrotum, the parent worms in

rammed by

able to pass

occasioned

by the eggs that have prematurely escaped from the body of the female parent and which are far thicker than the embryos. This obstruction to the onward passage of embryos explains why in elephantiasis frequently no filariæ are found in the blood An engorgement of lymph and

dilatation of the lymphatic vessels at first takes place in the legs and scrotum, and frequently repeated inflammatory attacks gradually cause hypertrophy of the connective tissue. The hypertrophy affects in particular the skin, the intra muscular cellular tissue, the aponeuroses, and the sheaths of the nerves and vessels. In recent cases, especially, small celled infiltrations are embedded on many spots of the newly formed connective tissue The muscles, in consequence of the pressure, may become atrophied or may be the seat of fatty degeneration The blood vessels as well as the lymph vessels are found to be dilated, their walls thickened and the capillaries increased in numbers. The bones may be thickened and covered with osteophytic out growths, or in rare cases may be atrophied Sometimes circumscribed abscesses with caseous contents resembling those of tubercular changes may be seen in the bones. The epidermis is much thickened in some parts and in others almost unchanged The papillæ are sometimes atrophied, sometimes enlarged, the sweat glands atrophied or their excretory ducts lengthened and the glandular elements degenerated, and similar changes occur in the hair follicles Manson believes that circulating lymph is necessary for the life of filaria Bancrofti, and that therefore in elephantiasis, in consequence of the absence of collateral tracts, the stasis becomes complete or nearly complete and the parent worm dies

It may be taken for granted that in those cases of *lymph scrotum* and *varicose groin glands* in which the contents of the dilated vessels are of a chylous nature the adult worms have their seat in the thoracic duct, and that these affections are but a part of the lymph varices of the abdomen and pelvis If, on the other hand, the fluid is not milky but clear, the seat of the adult parasite may be sought in the groin glands or their periphery, which in consequence of the obstruction set up by the ova, embryos or even the parent worms themselves, are impassable In such cases the parasites will not be found in the blood In lymph scrotum, as in hæmato chyluria, a rupture of the dilated superficial lymph vessels of the cutis takes place

Young of Charing Cross Hospital, found the following pathological-anatomical conditions at the autopsy of a young sailor from Jamaica aged 21 years who for seven years had suffered from *lymph scrotum* and *varicose groin glands* and finally committed suicide (hydrocyanic acid) —The principal organs were normal The spermatic cords on both sides were surrounded and permeated by a great mass of stretched, tortuous, and irregularly varicose lymphatic vessels. The inguinal canals owing to the dilated ... large that three fingers could easily pass along them. The ... were enlarged in some instances to the size of a ... lumbar vertebræ there was a ...

[illegible]

colour, ... were as large as ... opaque contents ... vessels were ... the faint brownish ... by the mass of ... walls the ... were entirely covered and hidden ... in the pelvis, between the bladder The kidneys ... of varicose lymphatics beginning ... lymphatics coming from the scrotum Another group ... connected with the dilated ... The receptaculum chyli could not be and rectum, were ... chief retro peritoneal mass. ... the bowel and intestine were and formed the ... lacteal vessels were not dilated ... thoracic duct lay on the vertebral column d...nguished The ... the thorax the dilated ... very tortuous and here and there it was ... the normal It wa...

[illegible] ...nto the mont... duct a No ... ves. Unfortu... ...ed lympha... Out of o...

... (English) catheter ... it was not poss... nately at the autopsy it was not poss... quickly into the abdomin... ... twice when the chyle flowed quickly into te abdomin...

cut made into a lymphatic vessel of the right groin a small bundle fell it had the

In *orchitis* and *chylocele* the adult worms probably are situated in the thoracic duct the varicosities extend from the lymphatic vessels of the abdomen to those of the vas deferens and through the bursting of the latter a chylous effusion takes place into the tunica vaginalis

It would be imagined that by means of the dilated lacteal vessels bursting into the peritoneal cavity *chylous ascites* would be set up, but as already mentioned no observations have hitherto been made of such an occurrence

The rupture of the dilated lacteal vessels into the intestine explains the appearance of *sanguineous* and *chylous diarrhœa*

It will therefore be noted that the seemingly heterogeneous diseases comprehended under the collective name of *filaria disease* are essentially attributable to the same ætiological factor

Should the parasites take up their abode in a place where they engender no obstruction to the flow of lymph as for instance in the wide receptaculum chyli it is quite possible that filaria embryos may be met with in the blood of seemingly perfectly healthy persons

It is possible that other causes may originate the same disorders as filaria
rhagia
enden
It is
origin in all cases from the mere fact that repeated examinations have failed to reveal filar al embryos in the blood urine &c Should the person affected be living in countries where filarial disease occurs endem cally or should he have ever previously lived in such countries filarial infec tion must be cons dered to be a poss ble cause If during the further course of the disease the parent worms perish no embryos or ova will be found for even if formerly present they disappear after some time by becoming dissolved or by being carried off by the urine or some other normal or abnormal secretion or excretion but the local disorder wh ch they have caused persists Embryos also cannot be found if the adult worm of one sex only is present as no propagation can take place

Ever since the filaria sanguinis hominis was first observed we have been acquainted with the fact that—probably dependent on the periodical deposit of the embryos by the parent worm—at one time the embryos will be found in the blood of a patient and at other times in the same person they will be absent

Moreover, as we have already seen there are cases in which the embryos do not reach the blood at all although they are present in the flu d secreted in lymph scrotum the lymph of varicose glands &c Th s
... the dwel ng place of the filar a is immediately
and

very
are
arm

... first appear in the evening they attain their maximum at ...

which were naturally undertaken during the day had negative results Night time preferably the hours between 11 p m and 2 a m, should be chosen for making blood examinations

Hitherto no satisfactory solution as to the reason for this extraordinary phenomenon has been forthcoming

or no embryos

dra n during sleep accelerate tl e flow of lymph nto the blood Wl en the lymphat reg on attacked by the disease is completely cut off from the lymph stream as occurs frequently in elephant as s of one leg no embryos can reach the blood from thence even dur ng the recumbent pos t on

Accord ng to v L nstow the nocturnal appearance of tl e embryos in the blood is intimately connected w th sleep and depends on the fact that the peripheral

In n nety s x cases of and n ght Thorp t mes transform ng

n ght into day and *v ce vers t*

The embryos that have invaded the blood are most probably removed from the body by means of the various secretions so that by day the blood again appears to be free from them Filarial embryos have even been found in the tears of filaria patients

Manson designates the filaria Bancrofti in consequence of the nocturnal appearance of its embryos in the blood as *filaria nocturna* and d fferen tiates *filaria diurna* and *filaria perstans* from it

rud ment of a vag na other two

forward. Manson, however, has also observed locomotion in embryos of filaria nocturna

sickness of the negroes The negroes however in whose blood he found these parasites were quite healthy

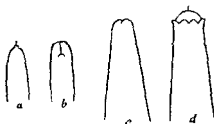


Fig 43.—Head end of *filaria perstans*, (*a*, *b*), and of *filaria nocturna* (*c*, *d*), after Manson

with filaria perstans

The pathological significance of filaria Demarquayi is not yet known Their parent worm was probably first found in British Guiana by Daniels At the autopsy of a native Indian, whose blood had exhibited sharp tailed as well as stump-tailed embryos, Daniels, besides finding several filaria perstans in the sub peritoneal connective tissue, came across a female and the fragment of a male of another kind of filaria, which was distinguished from filaria perstans by being of about similar length but nearly double its thickness

the superfluous portion of the scrotum is removed as close to the testicles as possible and the flaps are sewn together

Manson, however, frequently observed that this operation was followed by chyluria, or elephantiasis of one leg

plugged for several days necessitating tapping
o and the open lymph

Abscesses forming in filarial disease should be treated like ordinary abscesses

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VI

ANCHYLOSTOMIASIS

SYNONYMS

Ankylostomiasis Ankylostoma anæmia Ie Ankylostomiasis Krankheit Dochmiosis

HISTORY

Anchylostomum duodenale was discovered in Milan by Dubini in 1838. In 1846 it was found by Pruner and a few years later Bilharz and Griesinger discovered the parasite in Egypt and Griesinger recognised it as the cause of *Egyptian chlorosis* Wucherer in 1866 f [illegible] and attributes the *tropical chlorosis* so prevalent in those p[illegible] v Grassi C and Parona and others, [illegible] st brick makers and the other [illegible] epidemic appearance of anchylostomiasis amongst labour[illegible] d in the construction of the St Gothard's tunnel excited great attention [illegible] following year the nature of the disease having been first recognised by Perroncito and Concato After the completion of the tunnel the dispersion of the labourers caused the spread of the disease over a wide district of Italy This epidemic called attention to *miner's anæmia* and *mine cachexia* Perroncito was the first to point out that these ailments were at least partly *caused by the anchylostomum duodenale*

Though our knowledge of the parasite is only of recent date the disease it causes has long been known Joachim believes that a disease described in an Ebers papyrus, and which is supposed to date back to 1550 B C at the latest refers to anchylostomiasis The first news of the disease came from Brazil to England in the seventeenth century Piso in 1648 reporting a disease—*Opilatio*—which is undoubtedly a Latin conversion of *Oppilação* the present popular term for the disease there

The following are more designations under which the disease has been described *Egyptian chlorosis anæmia of Ceylon Tropical chlorosis anémie des pays chauds Hypoæmia intertropicalis Geophagia dirt-eating disease Mal d'estomac mal de cœur cachexia aqueuse cachexie africaine Amarellão* (jaundice) *Cançaço* (fatigue) &c

GEOGRAPHICAL DISTRIBUTION

Though anchylostomum duodenale does occur in temperate zones it is *principally warm countries* in which it is endemic and generally distributed amongst the population

In Africa the geographical regions of distribution of the parasite are Egypt Abyssinia Tunis Algiers Madeira the West Coast of Senegal as far as the Congo Cape Colony (Kimberley Mines and De Beers Mines) Natal Orange River Colony (Bloemfontein) German East Africa (district of the Kilima Njaro) Zanzibar the Comores Madagascar and Mauritius

[1] Die Heilkunde der alten Ägypter nach dem Papyrus Ebers. *Transactions of the XI Intern Med. Congr Berlin* 1890 vol. v part 15, p 37

In Asia the parasite is found in Travancore, Bengal, Assam, Madras, Ceylon, the Malay Peninsula and Archipelago, Luzon (Manila) and Japan.

In America the disease is observed in a few *southern states* of the

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robably be traced

back to 1777, Brennberg near Ödenburg, ... Resicza, Anima in the Banat), Rhineland and

Essen, Bochum, Dortmund,

Limburg, Mons), in France (

St Etienne), and amongst

Wurzburg, Berlin, and near Kosen)[1] The cases met with in Germany were those of Italian or Belgian labourers who work in summer in the

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rejected in consequence of anæmia In Madras, according to Williams of fifty cadavers examined, twenty-six, *i e*, 52 per cent exhibited anchylostoma, and in Budaon (north western provinces), according to Close, of 81 cadavers 44, *i e*, 54 *per cent*, exhibited the same condition In Java (Batavia) I found this intestinal parasite in 88 2 per cent of autopsies (15 times in 17 cases), in Japan (Kioto) in 13 5 per cent (5 times in 37 cases) In Guatemala Prowe found anchylostoma 46 times in 83 cadavers, *i e*, in 55 per cent

NATURAL HISTORY OF ANCHYLOSTOMUM DUODENALE.

The *anchylostomum*[2] *duodenale*, or *dochmius duodenalis* (Leuckart)[3]

more pointed processes lie deeper within the oral capsule

below) The hinder end of the head capsule communicates with the very muscular pharynx, and to this is attached the large intestine which is often filled with more or less fresh blood and thus gives the worm a reddish or brown colour, when the digestive canal is empty the worm has a whitish appearance

The *male* (see fig 44) which according to Leuckart is 6—8 or exceptionally 10 mm in length terminates in a bell shaped bursa with a

attached to one common trunk, while the fifth emerges from the root of the dorsal rib The male sexual apparatus is a simple long tortuous canal, consisting of the testicle and spermatic duct, the oval or fusiform seminal vesicle and joined to this a long wide ejaculatory duct

The female (see fig 45) which according to Leuckart is 10 to 12 and more rarely even 18 mm in length and about 1 mm in breadth (the male is some what thinner) has a conically pointed caudal end The vulva lies behind the centre of the body, and a short tube leads from it into a double muscular vagina to which an anterior and posterior uterus is joined both of which lead to a tortuous long ovary



Fig 46 —*Oral capsule* of anchylostomum duodenale After Leuckart

In copulation the male grasps the body of the female by means of the bursa, which is fixed by the introduction of the long spicula, at the entrance of the vulva Such little couples have the form of a γ (Sonsino), but it is very rarely that anchylostoma are discovered in this position

When coupled together during copulation the

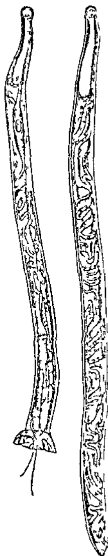


Fig 44 Fig 45

Fig 44 —*Anchylostomum duodenale male* After Perroncito Enlarged ten fold

Fig 45 —*Anchylostomum duodenale female* After Perroncito Enlarged ten fold.

deposited when segmented and are evacuated with the stools of the patient In fresh stools the yolk is found to be divided into two, four, or even eight globules, it is only very rarely that ova are found unsegmented If the stools are allowed to stand

a little while the segmentation becomes complete, and the rhabditiform stage is attained

The statements of authors as to the size of the ova vary considerably, as will be seen from the following table —

Leuckart	44 50 μ long and	23 27 μ wide
Meuche	70 " "	40 " "
Bugnion	60 " "	40 " "
Railliet	52 62 " "	32 43 " "
Bizzozero	58 62 " "	38 40 " "
Leichtenstern	56-63 " "	36 40 " "
Blanchard	55 65 " "	32 43 " "
Sonsino	50 69 " "	30 40 " "

According to Leichtenstern if properly magnified with stronger lenses it will be perceived that there is another very delicate outline within the contour of the shell and lying close to it

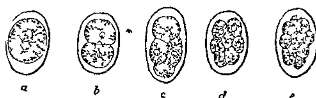


FIG 47 —*Ova of anchylostoma* in various stages of segmentation After Perroncito Magnified 300 times

The anchylostomum duodenale lives in the *upper part of the small intestine* The jejunum and not the duodenum is the region of the intestine chiefly inhabited by the parasite according to Dubini It has even been found in the ileum far beyond its middle and even in the cæcum (Riou Kerangal), it is rarely found in the stomach The worm is fastened between the folds of the mucous membrane by its head, the oral capsule, like a cupping glass, draws a piece of the mucous membrane into its cavity and fixes it with its teeth as with barbed hooks The worm opens the blood vessels with the pointed processes at the base of the capsule and imbibes the blood It probably only lives on the plasma without digesting the corpuscles, as these are mostly evacuated by the worms unchanged

The anchylostomum is found in hundreds and thousands in the same intestine, the females generally preponderating in numbers Bilharz states that the proportion of males to females is as 1 3, Lutz 2 3 Leichtenstern 10 22, van Emden 2 2 8 Bilharz s opinion is founded on observations made at autopsies, the other authors ground their statements on the number of ejected worms counted Only in two cases did Leichtenstern find more males than females Like Bilharz, I found one male to three females in the cadaver Sandwith, however, in contra[illegible] per

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[illegible]

Segmented ova of anchylostoma cannot develop into *embryos* and *larvæ* in the intestinal canal of man, as they lack oxygen there The

development, however, occurs if the fæces containing ova is spread out and exposed to a temperature of 25—30°. Moist earth or a mixture of earth and fæces may be used for cultures A temperature of 1° after an exposure of twenty four to twenty eight hours, kills the ova without exception (Looss) The fact that the anchylostomum requires a relatively high temperature for its development explains why this parasite, the principal breeding places of which is in hot countries, exists in temperate climates where its tropical requirements are present as in mines and tunnels

According to Leichtenstern the most favourable medium for culture is the fæces, [illegible]

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[illegible]

The anchylostoma invade the human intestinal canal in their larval condition.

On the grounds of experiments made on his own person, Looss is of opinion that the larvæ are able to *enter the body by the skin*, whence they probably make their way to the bowel by some unknown channel and there attain puberty

ETIOLOGY.

Infection by anchylostoma takes place by way of the stomach and intestine From what we know of the conditions of life of the parasite, *water* or *moist solid materials*, are the media of transmission.

Favourable opportunities for the propagation of the disease are afforded in places where, in consequence of there being no latrines, excrement in large quantities is deposited in the vicinity of human habitations, or, as is the case in mines and brickfields, it is deposited near the dwellings of the labourers. The danger is still further increased if the soil be of soft clay, packed by being much trodden on, or on which domestic animals live, and where there is not sufficient drainage to carry off the rainwater; these conditions are particularly prevalent in the less civilised countries. It can be easily understood that under these circumstances, the people who live in such environment by various means, such as going bare footed and afterwards washing their soiled feet, using dirty utensils, wearing soiled clothes, &c., contaminate their hands and get the encysted larvæ beneath their nails, whence they find their way into the mouth. This is most apt to occur in labourers who eat their meals on the spot, and convey the food to their mouths with hands that have not been thoroughly washed. This mode of infection is particularly likely to occur in children, especially such as are not very steady on

Transmission cannot take place by means of dust as has been asserted by v. Schopf and others, for, as mentioned above, dried up larvæ perish very quickly.

As Leichtenstern has proved by experimentally giving food contaminated

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worms had not yet attained puberty, the females having no ova and the males no developed spermatic elements. Copulation takes place in the fifth or sixth week, and the ova are removed from the body with the intestinal evacuations of the host.

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or five weeks elapse.

The disease may attack *either sex* and *every age*. Infants of the tenderest age are even attacked.

There is no racial predisposition. It is true that the disease mostly *occurs in the coloured races, but this circumstance is attributable* less to the peculiarities of race than to the unfavourable hygienic conditions under which they live.

Zinn and Jacoby assert that *negroes* are immune to anchylostomiasis to such a degree that it presents a racial peculiarity. In twenty one out of twenty three negroes from East Africa, West Africa, and Guinea these authors found ova of anchylostoma in the stools; in several in such great numbers as to lead to the belief

been present. In spite of this fact

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servers gave no *further infor*

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negative. The conclusion is

mber of worms, for if many

hundreds of anchylostoma were present in the intestine such a therapeutical failure would be a very rare occurrence Leichtenstern came across dozens of cases in his practice, one person harboured 50—100 anchylostoma without exhibiting any remarkable symptoms of anæmia As the natives in various countries suffer from severe anæmia in consequence of anchylostoma, it would be miraculous if the negro race alone formed the exception

The disease is observed more frequently *in the country* than in towns and persons whose *occupations* necessitate their working in damp soil, such as agricultural labourers, gardeners, ploughmen, brickmakers, bricklayers, miners, street sweepers and cleaners of privies, are principally attacked, a circumstance easily accounted for.

SYMPTOMATOLOGY.

Many persons harbour a small or moderate number of anchylostoma and do not suffer from the slightest indisposition. According to Leichtenstern, the general health only deteriorates when hundreds of worms (at least 300—400) are harboured

Anchylostomiasis is attended by signs and symptoms of more or less severity. *Anæmia* is one of the most pronounced of the accompanying conditions, and with it marked *disorder of the digestive organs*

The anæmia is primarily attributable to the blood lost by the patients This is caused, not only by the blood actually imbibed by the anchylostomes, but by the continuance of the bleeding from the leech like wounds after the parasites have relinquished their hold Besides the immediate loss of blood, two other conditions conduce to cause anæmia, firstly, the digestive disorders from which the patients suffer in consequence of the morbid condition of the stomach and intestine, and secondly, an intoxication set up by a virus given off by the parasites The discrepancy between the small number of worms and the severity of the anæmia is accounted for by such an intoxication, and it explains also the anæmia occurring not only in chronic cases in which formerly there was a large number of parasites that have decreased in course of time, but in fresh cases also. Perhaps, also, as in the case of the Bothriocephalus, the virulence of the anchylostomum is different locally and periodically There is, however, no proof to justify such a conjecture

The hypothesis of the generation of a toxin is supported by Lussana s investigation.

parasites.

The toxin hypothesis is moreover supported by the retinal hæmorrhage that sometimes occurs in anchylostomiasis, as well as by the proportion of the *hæmoglobin constituents*, to the number of blood corpuscles

The *commencement* of the disease may be fairly acute if a large number of larvæ enter the stomach at the same time, as a rule, however, the disorder starts insidiously, the introduction of the larvæ occurring gradually

Favourable opportunities for the propagation of the disease are

be of soft clay, packed by being much trodden on, or on which domestic animals live, and where there is not sufficient drainage to carry off the rainwater, these conditions are particularly prevalent in the less civilised countries It can be easily understood that under these circumstances, the people who live in such environment by various means, such as going bare footed and afterwards washing their soiled feet, using dirty utensils, wearing soiled clothes, &c, contaminate their hands and get the encysted larvæ beneath their nails, whence they find their way into the mouth This is most apt to occur in labourers who eat their meals on the spot, and convey the food to their mouths with hands that have not been thoroughly washed This mode of infection is particularly likely to occur in children, especially such as are not very steady on their feet, as at one moment they may have their hands on the soil and at the next moment in their mouths, they may even choose earth, clay, or sand, to play with The larvæ may, moreover, be washed by the rains from the polluted soil into water used for drinking purposes, thus forming another source of infection

Transmission cannot take place by means of dust as has been asserted by v Schopf and others, for, as mentioned above, dried up larvæ perish very quickly

As Leichtenstern has proved by experimentally giving food contaminated with larvæ to human beings, the larvæ pass unchanged through the stomach, their capsule becomes loosened in the intestine, and in this situation, after actually shedding their skin, they develop to adult anchylostoma In the fourth week after infection Leichtenstern found the worms had not yet attained puberty, the females having no ova and the males no developed spermatic elements Copulation takes place in the fifth or sixth week, and the ova are removed from the body with the intestinal evacuations of the host

Looss has studied the development of anchylostoma in the intestine of the dog where they go through two further *processes of moulting* After the first moult they are provided with a provisory oval capsule, but after the second with a definite one From the period of the introduction of the larvæ until the adult form is attained four or five weeks elapse

The disease may attack *either sex* and *every age* Infants of the tenderest age are even attacked

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The hypothesis of the generation of a toxin is supported by Lussana's investigation. This author confirmed the presence of *toxins* conducing to anæmia in the *urine of persons* suffering from anchylostomiasis. He condensed the urine at 60—70° to the thickness of syrup, extracted the residue with pure alcohol and dissolved the extract after evaporating the alcohol in a little sterilised water. With this solution he subcutaneously injected rabbits for eight consecutive days and thereby induced a loss of colour of the red blood corpuscles, poikilocytosis and increase of fibrin. After the d... continuation of the injections these symptoms rapidly disappeared. Urine condensed in the same manner as mentioned above but freed from parasites caused no disorder in the rabbits. Lussana's observations have been confirmed by Arslan, but on th... other hand not by Aporti.

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Many persons harbour a small or moderate number of anchylostoma and do not suffer from the slightest indisposition According to Leichtenstern, the general health only deteriorates when hundreds of worms (at least 300—400) are harboured

Anchylostomiasis is attended by signs and symptoms of more or less severity *Anæmia* is one of the most pronounced of the accompanying

crepancy between the small number of worms and the severity of the anæmia is accounted for by such an intoxication, and it explains also the anæmia occurring not only in chronic cases in which formerly there was

The hypothesis of the generation of a toxin is supported by Lussana's investigation.

other hand not by Aporti

Bohland in two cases of anchylostomiasis observed an *increase of decomposition of albumen*, which he attributes to the effect of a protoplasmic virus, engendered by the parasites.

The toxin hypothesis is moreover, supported by the retinal hæmorrhage that sometimes occurs in anchylostomiasis, as well as by the proportion of the *hæmoglobin constituents*, to the number of blood corpuscles

The *commencement* of the disease may be fairly acute if a large number of larvæ enter the stomach at the same time, as a rule, however, the disorder starts insidiously, the introduction of the larvæ occurring gradually

pressure or it may be felt only when the part is palpated

The *appetite* at the commencement of the illness is frequently increased to actual bulimia In other cases especially during the later course of the disease it is decreased to absolute anorexia Sometimes there is more or less eccentric desire for unripe fruits green maize ac d foods &c or a great longing for such substances as cement burnt clay chalk wood coals woollen material paper feathers &c As already ment oned the disease has [illegible] *pl agia* but this symptom is [illegible] but occurs in ord nary chl[illegible] ntestinal worms are present Through the alkalies contained in the earth the ac ds of the stomach are neutralised and the digestive disorders of the patients are relieved (Prowe) Geophagia is noticed particularly in children

[illegible]

death the po sonous const tuent of th s mater al however has not been found. Accord ng to Altheer the reason for d rt eat ng is that the b tum nous argillaceous earth conta ns a r[illegible]n ts numerous pores wh ch orig nates an agreeable stomach c

[illegible]

The following disorders are also frequently complained of by the patients Heart burn a sensat on of weight after eating eructations nausea and vomit ng Sometimes even blood is brought up in larger or smaller quantities The ep gastr c region is frequently distended with wind the tongue whitish and coated with slime and there is increase of the secretion of saliva Goldmann frequently observed *ulcer of the stomach* a condition which would still further tend to produce anæmia Leichtenstern in chronic cases occasionally observed at autopsies a *dilatation of the stomach* associated with an atonic and thickened condition of the wall with a lack of hydrochloric acid in the gastric juice in exceptional cases also he found an arrest of gastric secretion

Constipation usually obtains but in far advanced cases diarrhœa or even dysenteric symptoms may prevail [illegible] to as k ir

clayey contents. In the later stages the intestinal evacuations contain undigested food, and slime and blood The mucus is seen partly coating the fæces and partly in the form of large or small lumps The blood is either mixed in larger or smaller quantities with the mucus, or large quantities of liquid blood are evacuated According to Leichtenstern, bloody stools are also frequent in fresh cases, especially when the invasion of the larvæ is sudden and in great numbers, in older cases, on the other hand, blood in the stools is hardly ever observed

It is only quite exceptionally that dead anchylostoma are spontaneously passed at stool On the other hand the ova are often found in the fæces in great numbers According to Leichtenstern, four million ova in one stool are not unusual They are usually evenly distributed in the fæces, and are easily discovered by the microscope.

The number of *anchylostomes contained in the intestine* can be approximately computed from the number of ova in the stools, according to Grassi and Paroni, 150—180 ova in 1 cg of fæces correspond to 1 000 worms i e 750 females and 250 males

According to Leichtenstern the number of females (x) can be computed by the number of ova in 1 g fæces (a) divided by 47 (x) Loose stools are not suitable for such reckonings

Charcot-Leyden's crystals, although not a constant constituent of the

Leichtenstern, during his experiments on the effects of foods, found that the *Charcot Leyden's crystals* appeared in the third week after the ingestion of the larvæ, and that the first ova of anchylostoma appeared eight days later in the stools

Charcot Leyden's crystals are probably a product of the parasites Leichtenstern,

observers.

Lutz occasionally observed *circumscribed peritonitis* with very slight general disturbance The intestines in consequence may become covered by an effusion of lymph which, although it causes some temporary [illegible] disappears in a few weeks

the circulation play the disease The patients frequently complain of *palpitation of the heart*. At first this is only

accompanied by shortness of breath and sensations of pain, which are described as being darting, or burning, or sometimes as a dull pressure. These pains have given rise to the disease being designated *mal de cœur*. Lutz ascribes this sensation of pain, as well as the pains in the limbs to be mentioned below, to a sense of fatigue, the result of the accentuation

and acceleration of the action of the heart The pulse is accelerated easily excited, occasionally intermittent or irregular, the impulse of the heart is unusually strong There is in some cases hypertrophy of the heart, particularly observable in the left ventricle. Anæmic cardiac murmurs, as well as *bruit de diable*, are frequent symptoms Actual endocarditis and valvular disease have also been observed Dropsy sometimes sets in, the cheeks, eyelids, the dorsal *aspects of the hands* and feet being most usually swollen, in bad cases ascites hydrothorax and more rarely, cerebral œdema occur

The blood *even macroscopically, appears considerably paler than* normal Microscopical examination of the blood shows that the red corpuscles are diminished to two or even one million in the c b m m and even to less *There is also a fair degree of poikilocytosis and microcytosis* The proportion of the leucocytes to the red corpuscles is at first normal, later on the white blood corpuscles are increased Masius and Francotte *cite a case in which a leukæmic condition of the blood developed during* the last stage of the disease, the white blood corpuscles were of various sizes, the so called bone marrow cells were also present in larger *numbers than normal Various observers (Muller and Rieder, Zappert* Bucklers) incidentally discovered numerous eosinophile cells

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corpuscles most frequently averaged between two and three millions per *c b m m, the hæmoglobin contents averaged* 26 per *cent (This observa*tion is confirmed by Gowers)

The *skin* of patients in whom the disease is far advanced is livid pallid, with a yellowish tinge, *resembling the appearance of the skin in* malarial or cancerous cachexia Actual icterus, however, is exceedingly rare (Sandwith) Occasionally, the cutaneous pigment is increased, not only does the colouration *partake partly of the nature of an ephelis,* but chloasma obtains and occasionally the entire skin is more pigmented than usual (Lutz) The skin of the coloured races becomes lighter from *the effects of the anæmia, in negroes, particularly, it becomes grey,* or ashen grey, and withered dry lustreless and exfoliating

The *mucous membranes* as well as the skin, are pale

The remaining symptoms *to be noted in persons suffering* from anchylostomiasis are all more or less direct consequences of anæmia and appertain for the most part to the nervous system There is *headache tinnitus aurium, darkening of the field of vision,* giddiness swoons, weakness fatigue, sleepiness, apathy, a tendency to shiver In addition to these there is, moreover, formication and ' falling asleep of the limbs, *also pains in various parts of the body, particularly* in the legs Sandwith, in 48 per cent of his cases observed absence of the patellar tendon reflexes, in 5 per cent of cases the reflexes were *diminished and in 12 per cent of cases* increased

A few observers such as Grassi Fischer, Nuel and Leplat mention the occurrence of retinal *hæmorrhages* and *neuro retinitis,* Leichtenstern *observed the occurrence of pains in the bones,* more particularly in the sternum

The *urine* is often copious and pale rarely albuminous Volckers *always observed a more or less* increased indican reaction

De Renzi always found *peptonuria* and *urobilinuria* as a consequence of the hæmolytic effect of the toxins of the anchylostoma

As to the *sexual functions*, severe anchylostomiasis in men causes impotence and in women menstruation ceases Conception seldom takes place except in mild cases of the disease and the infants are born in a miserable atrophic condition (Wucherer) The growth of young adults is seriously interfered with by the presence of a large number of anchylostomes in the intestines

The disease may lead to extreme emaciation, but on the other hand *nutrition* is not disturbed, and the fat of the body is even well developed

The *temperature* in mild cases is mostly normal in severe cases it appears on an average to be a few points lower in such cases also as in pernicious anæmia evanescent rises of temperature are observed (anæmic fever) Giles and Sandwith often observed fever which however, was only observable for a few days at the commencement of the illness The same symptoms occurred in monkeys that had been fed with the larvæ of anchylostoma

Pleurisy with some effusion (even without tuberculosis) was a *complication* observed by Leichtenstern with remarkable frequency and the same authority states that chronic nephritis occurs as a concomitant of anchylostomiasis

The *duration* of the disease varies considerably and may fluctuate between some weeks and several years ten or even twenty years

There may be spontaneous *recovery* When recovery takes place, if the patient is removed from the possibility of further infection the worms gradually die off and are evacuated The natural period of life of the anchylostomum appears to be at most five years according to Leichtenstern s computation in any case however it does not exceed eight years

If the parasites are expelled the recovery is remarkably quick in young people one to three months may suffice provided that irreparable damage has not already been caused by the disease If the parasites are not expelled the disease progresses and death may result through exhaustion extensive dropsy and profuse diarrhœa or the end may be hastened by intercurrent diseases such as pneumonia tuberculosis malaria beri beri and other illnesses

PATHOLOGICAL ANATOMY

The bodies of persons who have succumbed to anchylostomiasis are usually more or less emaciated in some cases however, the adipose tissue is remarkably well developed Œdema is frequently present and there may be accumulations of fluid in the various serous cavities and

[illegible] irly the left ventricle and the myocardium is relaxed very pale and of a more or less distinct [illegible]

observed

The *spleen* in uncomplicated cases is normal or shrunken and atrophic it is seldom amyloid

The *kidneys* are mostly very pale slightly fatty, seldom amyloid According to Wucherer Brazilian doctors found the pancreas enlarged

The *stomach* sometimes presents the appearance of chronic catarrh

seat of numerous petechiæ the size of and dark red and partly old and slate coloured In acute cases of anchylostomiasis the mucous membrane is dotted with fresh hæmorrhages whereas in cases of longer standing even when enormous numbers of worms are present only a few hæmor rhages may be seen To many petechiæ a worm is often found attached In others the deepened centre in which a solution of continuity of the

the number of clinging worms found In autopsies carried out some time after death portions of the anchylostoma may be found loose in the intestinal mucus

Several authors cite cases of larger hæmorrhages in the sub mucosa also Bilharz and Grassi found anchylostomes coiled up in these blood filled spaces and in Grassi s case the worms were still small and undeveloped On account of this discovery the authors sought to prove that there was a submucous stage of development of the anchy lostoma preceding their free life in the intestinal lumen The most pro bable explanation however is that these worms had strayed and bitten the mucous membrane through Sandwith sometimes found half of the bodies of anchylostoma bored into the mucous membrane

Especially in fresh cases sanguineous or chocolate coloured con s membrane is thickened patches has also been ric glands Prowe found fourths of all his cases d by Williams in which death ensued from perforation of the jejunum and in which a number of annular cicatrices were present in the duodenum and jejunum demon strated that anchylostoma probably also lead to intestinal ulcerations

Wucherer found adhesive peritonitis and Masius and Francotte in one case found the same changes in the bone marrow as are met with in pernicious anæmia the marrow showing a greyish red colour in the long bones with loss of fat Numerous medullary cells and nucleated red blood corpuscles were observed in the marrow

DIAGNOSIS

The diagnosis of anchylostomiasis is founded on the microscopical demonstration of the ova of *anchylostoma in the stools of the patients* They may be easily recognised and distinguished from the ova of other intestinal parasites It is possible perhaps to confuse them with the ova of the *oxyuris vermicularis* but even this mistake can be avoided if one remembers that the latter are smaller (52 μ in length and 24 μ in breadth) that they are unsymmetrical being more curved on one side than on the other that they have a thin but doubly outlined shell and that they contain an embryo which is already developed and possessed of lively movements

For examination the smallest possible portion of fæces is removed with

a needle and spread out as a thin layer on a slide If the stools are hard a little water is added, but this is unnecessary if the stools are pulpy or thin If the result of the examination is negative a purgative is given, after which often, even when but few anchylostoma are present, many ova are passed Sandwith recommends, when there is continued suspicion of anchylostomiasis, notwithstanding the circumstance that no ova are found in the fæces, that experimental cultures should be made with the stool The presence or absence of the parasite will then be proved with certainty

The examination of the stools differentiates anchylostomiasis from *chlorosis, pernicious anæmia malarial or cancerous cachexia, cardiac affections*, &c , these ailments having some points of resemblance with anchylostomiasis

Rogers recommends the examination of the blood for the differential diagnosis [illegible]

number of anchylostoma

If in a severe case of illness only a few ova are found, the question of complications must be considered But it may be that the worms, which at first were present in great profusion have gradually diminished in numbers till only a few are left in the intestine, and yet the disorders caused by the parasites have not disappeared, the ravages being irreparable

PROGNOSIS.

The prognosis of anchylostomiasis is in general favourable, owing to our knowledge of means by which the parasites may be expelled with certainty It is only when the complaint has already made great strides that one cannot rely on recovery Sandwith, who has reported on more than 400 cases, succeeding in curing entirely or producing considerable improvement in 89 5 per cent of his patients 2 5 per cent were not relieved and 8 per cent died

PROPHYLAXIS

In order to avoid the disease, measures must be taken to put an end to the unhygienic conditions which prevail in some countries where the anchylostomum prevails Where latrines are wanting they should be erected, and the fæces deposited in these alone It is also advisable to cover the contents of the latrines daily with some soil with the object of *destroying* the larvæ, which require air for life, or the stools of the patients may be made harmless by disinfectants (chloride of lime, 10 per cent sulphuric acid, 2 per cent sublimate)

Giles advises the ploughing of infected areas in order that the embryos may be buried

As anchylostomiasis may be carried by patients and thus form new centres of infection, it is necessary to examine labourers who are to be employed in carrying out large earth works, erecting fortifications, building tunnels and canals, or employed on brickfields, or in mines; and if it is found to be necessary, purgatives should be administered It is also advisable to examine Europeans returning from warm countries, particularly if they are anæmic

Individuals must be warned to avoid infection by the most scrupulous cleanliness Hands soiled by labour must be thoroughly washed before each meal One should also avoid drinking polluted water Suspected water, when pure is unobtainable, should always be boiled or filtered before use

TREATMENT.

Treatment has a twofold mission (1) *the expulsion of the parasites*, and (2) *the relief of*

Two drugs have

filicis liquidum and

anchylostoma exhib

these drugs

Extractum filicis is, as in tape worm treatment, administered in gelatine capsules (up to 0 5) or with an equal or double quantity of syrup or brandy, to which 15 drops of chloroform may be added to prevent vomiting (Brolemann)

Leichtenstern advises, and with this I agree, that 10 0 should not be exceeded On the afternoon previous to the exhibition of the anthelmintic, a dose of calomel or some other aperient should be administered, and only a little light food given in the evening The next morning a cup of black coffee is given to the patient and the capsules should be taken within half an hour, or the mixture, divided into two parts, given at intervals of half an hour Two hours later a saline aperient is administered (Epsom salts, Carlsbad salts, or soda sulphate) The use of castor oil is to be avoided, as, according to recent investigation, the poisonous filicic acid is soluble in oily substances and absorbed very easily

In the case of patients who are much reduced, Parona recommends smaller doses on several consecutive days (2 0—4 0)

Failures, as in the tape worm treatment, are often attributable to the drug being of bad quality (Unless quite fresh the filicic acid in the preparation gradually changes into an inefficacious filicic acid hydrate, which is deposited in crystals)

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ness swooning and somnolence may occur and occasionally also amblyopia and amaurosis In very severe cases cerebro spinal paralysis may develop and a fatal issue result within a few hours

Thymol is exhibited in doses of 4 0—8 0 (Leichtenstern orders up to 10 0 or 15 0) in wafers or gelatine capsules The day before the thymol

stool follows an aperient is given twelve hours after the last dose (sulphate of magnesia or castor oil)

Monari orders 3 0 of thymol to be taken on several consecutive days, and Leichtenstern in ambulatory treatment orders 20 0 to be divided and given in small doses for several days namely every morning two to three doses of 2 0 each at intervals of two hours

After taking thymol the urine assumes an olive green colour which deepens if it is left standing

Thymol is *contra indicated* when there is a tendency to vomit, when there is great weakness a very low temperature in persons over 60 years of age and in advanced cardiac or other organic diseases care should also be exercised It should also be administered with great reserve in persons weak from anæmia dysentery, or malaria Leichten

ing to their age

The vermifuges fail more frequently in recent than in the older cases of illness the worms being then smaller and therefore more easily able to conceal themselves

If all the worms have not been expelled, a fact that can be ascertained by the continued presence of ova in the stools the treatment must if necessary be repeated several times but at no more frequent intervals than once a week and no case is to be considered to be cured until ova can no longer be found after several examinations on consecutive days Of course if all the females have been removed and only males are left, the latter being more difficult to expel probably in consequence of their smaller size no more ova will be exhibited in the stools The presence however, of Charcot Leyden s crystals serves to confirm the existence of worms

Sometimes after the treatment the ova disappear from the stool, only to again reappear after some time The reappearance must be due either to the fact that the adolescent worms were not expelled and that they

forms were not
after recovery
natural func
ols of patients

ia, is accomplished
Lutz recommends
necessitate trans
fusion or *infusion of common salt*

If the bowels are sluggish, saline aperients in moderate doses should be administered

Digitalis is indicated to improve the action of the heart when there is severe dropsy, accelerated and irregular *action of the heart*, *cyanotic* tinge of the lips and nails, and decrease in the secretion of urine

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VII

RARER AND LESS IMPORTANT PARASITES.

1 DISTOMUM CRASSUM, Busk

Synonyms *Distoma Busk* Lankester *Distoma Rathouisi* Poirier

This worm which was discovered by Busk in 1843 is the largest distomum hitherto found in man It has according to Braun (see fig 48) a length of 4—8 5 cm and a breadth of 1 4—2 cm It is principally



Fig 48.—*Distomum crassum* natural size After Leuckart.

It lives in the *intestine* and probably also in the *liver* of man and seems to cause *diarrhœa* and hepatic disorders

The distomum crassum has hitherto been found in China Selangor (Further India) the North West Provinces Assam and Borneo or in persons that have lived in these places

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in Germany (Cologne)

Natural History.

The *tænia nana* (see fig 49) is a small tape worm which, according to Leuckart, is rarely more than 20 mm [1] in length, it is of a white or pale yellowish colour, and its greatest breadth does not exceed 0 5 mm The anterior portion of the body, to about the extent of a third of its entire length, is thin and thread like, the body then spreads out towards the posterior part, the posterior third of the body being about the same breadth The spherical head which is 0 3 mm in diameter, has four round sucking discs and a rostellum provided with a circle consisting of from 24 to 28 exceedingly delicate hooklets, the rostellum can be thrust forward or retracted The number of small joints averages 180—200, of which the last 20 to 40 contain mature eggs The ova (see fig 50) according to Mertens, are oval, of a fairly light whitish colour, and remarkably transparent At their greatest axis they measure 47—48 μ on an average, and at their smallest axis, 38—39 μ The shell consists of two membranes, which are divided from each other by an interstitial substance consisting of wide meshed filaments which, at the extremities of the ovum averages 9—12 μ, and at the centre 6—8 μ The embryo, which is almost spherical, is 20—25 μ in diameter, and is provided with hooklets 6—10 μ in length

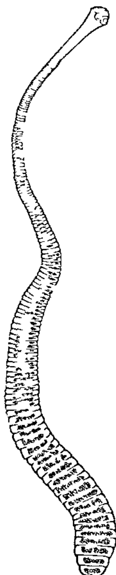


FIG 49 —*Tænia nana*, enlarged 18 times After Leuckart



FIG 50.—Ovum of *tænia nana* enlarged 600 times After Mertens

The *small intestine* constitutes the habitat of *tænia nana* and this is particularly the case with *children*, where they burrow deeply in the mucous membrane It is not uncommon for one intestine to shelter thousands of these parasites According to Grassi and Lutz *tænia nana* is identical with the tænia murina, [illegible]

the ova, v Linstow, however, disputes the identity of the two parasites

Symptomatology.

When the great number of parasites which often are sheltered by one person is taken into consideration it is not surprising that these worms

[1] The longest parasite observed by Mertens measured 3·25 cm. without the head which was not found.

are of pathological importance The disorders originated by them consist partly of symptoms of *chronic intestinal catarrh* and partly of serious *nervous affections* The intestinal symptoms consist of abdominal pains, constipation, alternating with diarrhœa, perverted appetite, bulimia and emaciation The nervous symptoms are attributable either to mechanical irritation exercised by the parasites by reflex action, or originated by a virus generated by them, they consist of insomnia, spasmodic movements, epileptiform attacks without loss of consciousness, weak memory, melancholia, &c Accompanying these symptoms dyspnœa and asthmatical attacks have been recorded, and Lutz also observed irregular attacks of fever in two cases

The fact that these symptoms are actually caused by the parasites is proved by the circumstance that they disappear after the expulsion of the worms.

Diagnosis.

[illegible]

Treatment.

[illegible]

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v. SIEBOLD and BILHARZ Zsch f wiss Zool [illegible]

3 BOTHRIOCEPHALUS LIGULOIDES, Leuckart

Synonyms *Ligula Mansoni* Cobbold *Bothriocephalus Mansoni* Blanchard

The Bothriocephalus liguloides (see fig 51), which has hitherto only been observed as a larva, attains according to Leuckart, a length of 20 cm, or even more with an average breadth of 2 5 mm It is of a faint white colour, and has a tape like jointless body of fleshy consistence which becomes narrower towards its posterior part Anteriorly the body widens out and supports a papilla like projection, on which the piercing apparatus and more or less stippled head, provided with two suctorial discs is situated Sexual organs are entirely absent and nothing is known of its development and origin It is conjectured that a domestic animal is the host of the definitive worm



Fig 51 —*Bothriocephalus liguloides* Natural size *a* My specimen *b* after Cobbold.

The parasite was found first by me in Japan in 1881 and in the following year by Manson in China (*Amoy*) *and since that time a number of cases have* come under observation in Japan Other homes of this parasite, however, have not become known

The *subperitoneal connective tissue* appears to be the natural habitat of the larvæ especially in the vicinity of the kidneys where it was found by Manson whilst performing an autopsy on a Chinaman who died of dysentery and stricture of the œsophagus From the subperitone[illegible] [illegible] the urinary [illegible] case) or it [illegible] total ten cases hitherto observed it has been [illegible] found at autopsies, four times it has been passed in the urine or extracted from the urethra (as in my case), it has been removed in three cases from a swelling in the vicinity of the eye, and it has once been extracted from the subcutaneous connective tissue of the lumbar region

The invasion of the urinary passages by the worm is followed by retardation of micturition and by pains in the urethra and vesical region which radiate to the thighs Hæmaturia has also been observed, the symptoms persisting until the parasite was got rid of It is therefore incumbent on the medical man, in countries where this worm is found, to consider the possibility of this cause when treating patients with such symptoms In my cases the urinary affections were preceded for some time by swelling and pains of the left testicle, a diffuse induration of the skin of the upper portion of the left thigh, as well as pains in the left inguinal region which radiated from thence to the hypochondrium, these advanced symptoms disappeared but they were probably attributable to the parasites

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4. FILARIA LOA, Guyot

Synonyms *Filaria oculi*, Gervais and van Beneden *Filaria subconjunctivalis*, Blanchard *Filaria lacrymalis*, Dubini *Dracunculus oculi* Diesing *Dracunculus loa* Cobbold.

Geographical Distribution

The West Coast of Africa especially Guinea is the local habitat of this parasite which was discovered by Bajon in Cayenne in 1768 From thence it was carried with the negroes to South America and the Antilles but, since the importation of negroes has ceased, it no longer occurs there

Natural History

The *filaria loa* is a thread like white or yellowish worm of the thick ness of a fine violin string The *female* is 30–40 mm long and rare attains the length of 70 mm The *male* is shorter 16—22 mm in lengt or somewhat longer The anterior extremity is rounded and blunt t posterior end is pointed the mouth has no armature but is somewh protuberant, and the intestine straight The caudal end of the male bent, and possesses five large papillæ on either side of the anus, an provided with two somewhat short and uneven spiculæ The uterus the female is filled with ova 35 µ in length and 25 µ in breadth, wh quite early contain embryos

The history of the development of the worm is unknown Ma formerly conjectured that the filaria diurna was the parent worm, appears to have relinquished this opinion as in one case of filaria lo was unable to find embryos in the blood and in another case Robert experience was similar

The parasite appears to have a long life for it sometimes comes observation ten years or even longer, after the patients have le endemic district

It lives in the cellular tissue under the skin and conjunctiva

Symptomatology.

Filaria loa is observed in various parts of the body, but more larly in the *eyelids* and beneath the *conjunctiva* It is possible occ to follow the lively movements of the worm in its migrations thr cellular tissue The motions are particularly lively in the wa warm weather, in a warm room in front of the fire), whereas into the depths in the cold It causes itching or stinging and a of creeping with a circumscribed redness and swelling on t affected When however it attains the sub conjunctival cellula ally prone to originate severe symptoms of inflamm itching and shooting pains) and w resemblance t

dacrocystitis It may also penetrate to the anterior chamber of the eye, as the case observed by Coppez and Lacompte proves Sometimes it migrates from one eye beneath the skin at the root of the nose to the other eye, Roth also believes that it sometimes attains the nasal canal and is then either swallowed or spat out

Predtetschenski (Moscow) in one case of *chyluria* found ova in the urine, which resemble the ova of tænia nana[1]

Treatment

The treatment consists in the *removal of the parasite*, which however is often a very difficult matter on account of its rapid movements Should it be situated beneath the conjunctiva, the eye should be cocainised, the globe steadied by the finger, a fold of the conjunctiva over the worm raised by forceps and incised by scissors, when the worm can be extracted by means of an iris forceps

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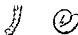
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5. PENTASTOMUM CONSTRICTUM, v SIEBOLD

Synonyms *Nematoideum hominis*, Diesing, *Linguatula constricta* Blanchard, *Porocephalus constrictus*, Stiles

Pentastomum constrictum, discovered by Pruner in Egypt, has hitherto only been seen in its larval condition It is from 13—23 mm in length

[1] *Russ Arch der Path* viii, No 6, *Ref Lancet* 1900, March 3 p 637, *Ztschr f klin. Med*, xl., Nos 1 and 2


a b
Fig 52 —Pentastomum constrictum After Pruner a, free, b, rolled up in a cyst

are divided by constrictions which, according to Gerard, number 16 to 20 The parasite has hitherto only been found in *African negroes* It is found partly rolled up in roundish *cysts*, each containing one parasite only (see fig 52 *b*) in the *liver*, in the *mesentery*, under the mucous membrane of the *small intestine* and in the *lung*, partly free in the *abdominal cavity* and in the *small* intestine

Pruner found the pentastomum constrictum in the giraffe also

The natural history of the parasite is still unknown It probably by some means gets into the intestine thence gains entrance to the liver in which the cysts originate from dilated biliary ducts, and attains the peritoneum The lungs seem to become infected by way of the trachea, and here the cysts are formed from dilated bronchioles The parasite induces no serious disorders in the intestine and liver, if, however, it ... inflammatory

... conse- ... of the ... at one time by a parasite which had subsequently been expelled from the body

... pentastomum con-

... the fæces for the

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6. THE SAND-FLEA. (Chigger)

Synonyms: Pulex penetrans Linné, Sarcopsylla penetrans Westwood, ...

the sand flea A ship carried the insect from Brazil to the West Coast of Africa in 1872, first of all to Ambriz, south of the Congo, it here spread with incredible rapidity, so that at the present time it is distributed over a large part of this quarter of the globe Lately it has appeared in Madagascar, India (Bombay, Karachi) and Further India (Penang), having been carried to these places from Africa In Ningpo (China) [illegible]

nuisance to the *natives* whereas Europeans, wearing shoes, are fairly safe from infection

The sand flea (see fig 53) is from 1 to 1 2 mm in length, being about half the size of the common flea, and is of a brown colour The males and the unimpregnated females, like the ordinary fleas, only transiently seek human beings in order to feed on their blood The *pregnant females*, on the other hand *burrow into the skin with their heads*, their presence being manifested as a black speck resembling an embedded splinter, easily recognisable on the skin of white people, but difficult to see on the dark skin of the negro In the course of five or six days the insect, in consequence of the growth of the numerous eggs, swells up and appears as a white ball the size of a small pea, on which the head looks merely like a small brown spot (see fig 54) In this manner a small subcu



Fig 53 —Sand flea female After Karsten



Fig 54 —Sand flea impregnated female After Karsten

taneous *swelling* is formed over which at first the skin is not reddened, but becomes inflamed after a few days In the centre of the swelling a dark spot is seen which indicates the point of entrance of the insect and from beneath which is the enlargement due to ova No development of larvæ occurs, nor are the eggs deposited whilst the parasite is in the skin, for the ova do not leave the body until the parent reaches the soil, sand, or wood (cracks and fissures of wooden structures) when the larvæ develop

The disorders caused by the sand flea are generally but trifling The pain of the puncture is so slight that it is mostly not even observed Later on the affected part itches, but if the parasite is speedily extracted —an operation in which negro women are very expert—no further consequences are apt to ensue Should this not be done, the skin over the insect suppurates, the symptoms of irritation become more severe inflammation and suppuration result, and the parasite is thrown off in the discharge Should the wounds originated by the insects become septic, a common occurrence on account of the habits of the natives, like

other neglected wounds they cause a wearisome suppuration which may extend to the tendon, sheaths and bones, and may set up gangrene, septicæmia, or tetanus

The part of the body most frequented by the chigger is as might be supposed from the fact of its living in the ground, the sole of the foot, especially the toes under the tips of the nails and the digito plantar folds More rarely, the male genitals the thigh, and other parts are affected

The number of parasites infecting a person varies considerably, but over 300 of these insects have been found on one person

The *treatment* consists in the removal of the parasite For this pur- [illegible] penetrated is enlarged [illegible] sharp knife, so that [illegible] and easily enucleated, [illegible] ally cleaned with sublimate (1 1000) is dressed and soon closes Unsuccessful attempts at [illegible]

In regard to the prophylaxis, protection is afforded from being infested by sand fleas by anointing the feet with oil of cloves, balsam of copaiba, balsam of Peru, or dusting them with insect powder It is also advisable to examine the feet twice a day in regions where the sand flea is common

It is of great importance to destroy the extracted insect, and not throw it carelessly on the ground so that it may contribute to the farther [illegible]

prophylactic [illegible] This method is not likely to be adopted on account of [illegible]

[illegible] purulent ulcers that only heal after weeks and which leave pigment spots that persist for years This complaint is said to be originated by tiny red mites. Balsam of Peru is a certain prophylactic for this ailment and should be rubbed on the lower extremities previous to every journey into the bush. It also is effective therapeutically on the first day

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COTES [illegible]
FISCH. [illegible]
GAERTNER [illegible]
[illegible] xi, No. 1, p 35
[illegible] 3.
[illegible] ion, p. 558.
[illegible] 1893, p. 963
[illegible]

[1] *Arch. f Schiffs u Tropen Hyg* ii., 1898 No. 5, p. 279

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of this parasite *It infests all warm blooded animals*, and is a great nuisance to the *natives* whereas Europeans, wearing shoes, are fairly safe from infection

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Fig 53 —Sand flea female
After Karsten

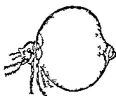


Fig 54 —Sand flea impregnated female
After Karsten

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other neglected wounds they cause a wearisome suppuration which may extend to the tendon sheaths and bones and may set up gangrene septicæmia or tetanus

over 300 of these insects have been found on one person

The *treatment* consists in the removal of the parasite For this purpose a small opening through which the insect had penetrated is enlarged with a needle a pointed piece of wood or a small sharp knife, so that the outline of the swollen chigger is laid bare and easily enucleated The small wound after having been antiseptically cleaned with sublimate (1 1000) is dressed and soon closes Unsuccessful attempts at extraction in which the impregnated female is torn are apt to cause more serious symptoms of inflammation In such cases it is advisable to lay open the track of the sand flea by an incision and to clean it out with a strong solution of nitrate of silver or hydrargyri perchloridi, nitric acid or pure carbolic acid

In regard to the prophylaxis protection is afforded from being infested by sand fleas by anointing the feet with oil of cloves balsam of copaiba balsam of Peru or dusting them with insect powder It is also advisable to examine the feet twice a day in regions where the sand flea is common

It is of great importance to destroy the extracted insect, and not throw it carelessly on the ground so that it may contribute to the further

danger from fire

first day

LITERATURE

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[1] *Arch. f Schiffs u Tropen-Hyg* ii, 1898 No 5, p 279

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7 THE LARVÆ OF FLIES

The larvæ of various species of flies occurring principally in warm countries acquire fact that they some times develop in more or less serious disturbances T comprehended under the term *Myiases* by Hope (from μυῖα, i e a fly) It is the larvæ that principally come under consideration

(a) Lucilia macellaria, Robineau Desvoidy

Synonyms *Musca macellaria* Fabric us *Lucilia hominivorax* Coquerel *Calliphora infesta* Ph l pp *Calliphora anthropophaga* Con l *Calliphora macellaria* Jorge *Musca anthropophaga* *Compsomyia rubifrons* Macquart *Somomyia montevidensis* B got *Screw worm fly* (America)

The home of this fly which belongs to the *Muscidæ* (blue bottle flesh flies) is America from the Argentine to the south and west of the United States In Brazil the ailment caused by this fly is called *bicheiro* (from *bicho* Portuguese for worm) It has recently also been observed in Cochin China by Baurac and in Tonquin by Depied Probably also the disease known in India as *peenash* belongs to the same category

FIG 55 —*Lucilia macellaria* After Blanchard a, Fly b larva, natural size c anterior part of fly seen from above and much enlarged d mouth hook—anterior view much enlarged

The *fly* (see fig 55 *a*) is 9—10 mm in length and has a metallic blue body with thick black hairs a red forehead three black longitudinal stripes on the thorax black legs and transparent wings quite colourless except at the bases where they are smoke coloured *It deposits its eggs* in wounds ulcers the nostrils (more particularly if suppuration is present) and in the mouth of man and beast more especially of persons who are unconscious through sleep alcohol &c The naso pharyngeal cavity and the palate are also favourite places

The larvæ, which develop from the eggs in a few hours (see fig 55 *b c d*) attain a length of 14—15 mm while alive they are salmon coloured and when dead opaque white *They consist of twelve segments which* carry rows of very small spines and which are so disposed that they

impart a screw like appearance to the larva (hence the des gnat on *screw worm* they are also provided with two powerful mouth hooks The larvæ at once set about their work of destruction they perforate the — of inflammation), attack um so that they become ugh suppuration d swelling and inflammation of the nose set in accompanied by violent pains and fever, the inflammation may spread more or less over the face and cause an erysipelatous condition a sanguineous or purulent offensive liquid flows *from* the nose and should the worms force their way to the base of the brain, meningitis may s t in and if they eat their way into the orb

nem
bra and
intra cranial suppuration

Death not uncommonly ensues through the above named contingencies or through septicæmia Of thirty eight cases compiled by Maillard, twenty one had a fatal issue

The *treatment* necessary is the imm diate removal of the larvæ by nzine, itions r have must be had to trephining these cavities

The *Sarcophila Wohlfahrti*, Portschinsky which exis s in Europe more particularly in Russia and originates s milar disturbances is related to the *Lucilia macellaria*

(b) Dermatobia noxialis, Brauer

Synonyms *Oestrus Guild ngi*, Hope *Cuterebra noxialis* Goudot *Dermatobia cyaniventris* Macquart.

This fly, which appertains to the family of the *Ostrides* (gad flies), occurs in America, from Brazil t the larva is known by various na called *Anal Coshol*), in Costa Rica it is named *Torcel* and *Suglacuru*, in Columbia it is known as *Nuche* and *Gusano pel lo* in Cayenne it goes under the name of *Vermacaque* and in Brazil it is desig



FIG 58.—*Dermatobia noxialis* After Goudot. *a* Fly *b* larva.

lays its eggs in the skin of cattle, sheep and dogs and sometimes in the skin of man The spots preferred by the fly in which to deposit its eggs are, according to Frantzius, the head and trunk, incidentally also the eggs are laid in the conjunctiva and in the lachrymal sac

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7 THE LARVÆ OF FLIES

The larvæ of various species of flies occurring principally in warm countries acquire pathological importance from the fact that they sometimes develop in human beings and thus originate more or less serious disturbances The diseases induced thereby are comprehended under the term *Myiases*, by Hope (from μυια, i e a fly) It is the larvæ that principally come under consideration

(a) Lucilia macellaria, Robineau Desvoidy

hominivorax Coquerel *Calli* Coquil *Calliphora macellaria* Macquart *Somomyia monte*

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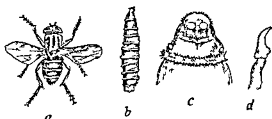


FIG 55 —*Lucilia macellaria*. After Blanchard. *a* Fly *b* larva natural size *c* anterior part of fly seen from above and much enlarged *d* mouth hook—anterior view much enlarged.

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impart a screw like appearance to the larva (hence the designation *screw worm*, they are also provided with two powerful mouth hooks. The larvæ at once set about their work of destruction, they perforate the

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Should the *palate* be attacked dysphagia and dyspnœa may occur

The larvæ developing in the *ears* bore through the tympanic mem brane, disintegrate the middle ear and may even cause meningitis and intra cranial suppuration

Death not uncommonly ensues through the above named contingencies or through septicæmia Of thirty eight cases compiled by Maillard, twenty one had a fatal issue

The *treatment* necessary is the immediate removal of the larvæ by

The *Sarcophila Wohlfahrti* Portschinsky which exists in Europe more particularly in Russia, and originates similar disturbances, is related to the *Lucilia macellaria*

(*b*) Dermatobia noxialis, Brauer

Synonyms *Oestrus Guildingi*, Hope, *Cuterebra noxialis* Goudot, *Dermatobia cyaniventris*, Macquart.

This fly, which appertains to the family of the *Ostrides* (gad flies), occurs in America, from Brazil to the south of the United States, where the larva is known by various na—



FIG 56 —*Dermatobia noxialis* After Goudot *a*, Fly, *b*, larva.

in Cayenne it goes under the name of *Vermacaque*, and in Brazil it is designated *Berne* and *Ura*

The *fly* (see fig 56 *a*) is 14—17 mm in length Its head is yellow, the upper surface of the thorax dark grey, the abdomen a bright steel grey, dirty white at the base, and the wings and legs are of a yellowish brown colour It mostly lays its eggs in the skin of cattle, sheep and dogs, and sometimes in the skin of man The spots preferred by the fly in which to deposit its eggs are, according to Frantzius, the head and trunk, incidentally also the eggs are laid in the conjunctiva and in the lachrymal sac

The *larvæ* are described variously the reasons for this being that according to the stage of their development they exhib t a d fferent con figuration probably also several kinds of dermatobia exist in d fferent countries as well as in any given district According to Goudot the larvæ (see fig 56 *b*) are 3 cm long of a whitish colour and a club like shape They are thicker at the anterior than at the posterior part the anterior half of the body is beset with hooklets and prickles and is besides provided with two strong oral hooks They cause an inflam matory reddish swelling which may become almost the size of a hen s egg (so called gad fly boil) A small opening is observed in the centre through which the creature breathes and through which also it voids its excrement as small black particles mixed with the exuding sero purulent fluid The posterior extremity is provided with the stigma—the resp ratory organs

Occasionally several larvæ are present in one boil each one being nevertheless separately interred so that the subcutaneous cellular tissue

juice into the opening this causes the larva to protrude somewhat more and it can then easily be pressed out The small wound is then treated surgically

Recently

fly bo ls ca

(*c*) Ochromyia anthropophaga, Em Blanchard

The geographical region of distribution of these flies is Senegambia especially Cayor for which reason the larvæ have also been designated *Ver du Cayor*

The *ochromyia anthropophaga* is a greyish yellow fly, 8—9 mm in length

dermatobia and hypodermia

The *larvæ* are 12 mm in length with a breadth of 5 mm they are white in colour and provided with minute prickly spines

In six or seven days they again leave their host to be metamorphosed into the pupa stage The small swellings caused by the larvæ soon heal

The treatment is the same as in the larvæ of dermatobia noxialis

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IV.—ORGANIC DISEASES.

I

TROPICAL APHTHÆ. SPRUE.

DEFINITION

By the term *tropical aphthæ* is understood a disease that only occurs in warm climates It is mostly exceedingly chronic, with alternate improvements and aggravations of the condition It is distinguished by a peculiar affection of the mouth and obstinate diarrhœa, which tend to

countries

SYNONYMS

Seriawan (Malay)

Probably *Ceylon sore mouth* and the illness known as *hill diarrhœa* and *hill trot*, which occurs on the hills in India in persons coming from the plains, especially during the rainy season and sometimes even becomes epidemic may be of this character

GEOGRAPHICAL DISTRIBUTION

reported on it in his observations made in Barbados in 1776

ETIOLOGY.

ences certainly play
a tropical climate
of the disease in
in Amoy, which

DIAGNOSIS

The diagnosis of tropical aphthæ presents no difficulties in well developed cases. It is sufficiently characterised by the peculiar *affection of the mouth the gastro*

of the mouth

PROGNOSIS

The prognosis of sprue is always serious Slight cases may recover if the patients submit strictly to the treatment, which is principally dietetic Should the disease have made further advances, and atrophy of the liver obtains recovery can only be hoped for if the patients at once seek a cooler climate or return to Europe, but even then many patients succumb Relapses frequently occur, especially when the patients return to a hot climate The prognosis is particularly unfavourable in persons over 50 years of age, and those who have been enfeebled by previous malaria

TREATMENT.

The treatment of sprue is *dietetic* even when the patients have returned to Europe

A *pure milk diet* is mostly recommended One should commence
to 2—3½ litres,
it is best taken
a baby's bottle
itient prefers it
and Roux, recommend
ve cannot endorse this
ue from drinking fresh
, water, lime water or
(sodii
advise
lime, which according to Wright's prescription, is accomplished by the addition of citrate of soda (1 400)

If milk cannot be borne or if there is an objection to it—Van der Burg quite eschews it—gruels and paps (arrow root, sago, tapioca rice water, barley water, oatmeal gruel maize flour, Nestlé's milk food and similar preparations) should be given.

When the condition has improved by means of the milk cure or farinaceous foods, thin broths, beef tea, meat juice, softly boiled or raw eggs, and scraped raw meat may be tried, and later on also other easily digestible meats (calf's sweetbread, poultry, roast beef, raw scraped ham), toast, stale bread, biscuits, digestible vegetables (spinach, purée of potato, well roasted sweet potatoes, carrots, asparagus), or farinaceous foods may be taken The greatest care, however, must be taken in the diet, and the stools constantly examined All acid, salty and seasoned foods are contra indicated, as also are wines, spirits and coffee The only drinks allowed besides milk, are cold water and iced water, or weak cold infusions of tea Cantlie, on the other hand, recommends hot water and rice water (an infusion of roasted rice) Smoking is prohibited

The carrying out of this *régime* requires great patience and self-denial on the part of the patients, but recovery can only be hoped for if it is carried out systematically and with perseverance Errors in diet, to which patients seem prone after improvement in the condition has set in, are always immediately followed by relapses, requiring the patients to immediately return to the milk diet Ordinary diet can only be resumed after the patients have passed normally formed stools for about three months (Roux)

In the Dutch Indies a style of treatment is largely adopted, which, irrational as it appears *a priori*, is supposed to have favourable results even when resorted to in the last stage of the disease, and which Van der Burg and others have found beneficial This is the *fruit cure* The following fruits are given to the patients in great quantities, either fresh or preserved, without sugar strawberries apricots, peaches, apples pears, grapes,
other watery fr
apples and very
be tried as a la
the acids contained in the fruits

In British India and Siam the *bael fruit* (*ægle marmelos*, which also grows in Ceylon and Java) is much used in the treatment of intestinal flux, either in a raw state or variously prepared as lemonade, extract, decoction, or syrup This fruit is distinguished by its copious contents of tannin

tropical
Carlsbad
water and salts are used, also *digestive fermentatives*, such as pepsine, ingluvin, pancreatin, papain (or fresh papaya fruit), diastase, &c Van der Burg also recommends *mineral salts*, especially sulphates Begg highly advocates the use of *santonin* (yellow, therefore impure), which, after giving a dose of castor oil he administers for six successive days (0 3 in a teaspoonful of olive oil) This method of treatment, however, appears to have found no supporters

Opium must be resorted to when there is severe abdominal pain and very violent diarrhœa, great care must be exercised in its administra

tion When there is severe diarrhœa starch enemata, with the addition of opium may be tried

Priessnitz s compresses are often found of service in relieving *abdominal pains*, and it is advisable in any case to apply these every night and morning for two hours

Constipation occasionally necessitates the use of mild aperients such as castor oil rhubarb &c Manson advises that the treatment be commenced with an aperient and that no food be given till it has acted

Powdered vegetable charcoal should be given when there is great *flatulence*

The mouth affection is combated by means of rinsing with carbolic acid 1 per cent alum chlorate of potash common salt and by touching the ulcers with the sulphate of copper or nitrate of silver pencil Amelioration is also afforded by smearing the tongue with cacao butter, or other mild grease before eating According to Van der Burg however the most satisfactory results have been obtained with inunctions of the juice of pterocarpus indicus or rinsings with a tincture made from the rind of this tree

It is advisable to pencil the tongue with cocaine (1 to 10 per cent) before meals

In convalescence the careful use of Amaris and tonics are indicated (wine quinine iron arsenic)

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II

TROPICAL DYSENTERY.

DEFINITION.

Dysentery is an infectious inflammation of the large intestine, which in advanced stages causes destruction of tissue and the formation of ulcers, the characteristic features of the disease are abdominal pains, tenesmus, and frequent but scanty muco purulent and bloody stools

It is a question that is still waiting to be solved, and which cannot be decided until the etiology of the disease is confirmed, whether dysentery is a specific disease or, as is largely assumed, whether it is attributable to a variety of causes, nor has it been settled whether *tropical dysentery* is etiologically identical with the dysentery of temperate climates

As dysentery is minutely described in all manuals and text books, I *think it is permissible for me to confine myself to discussing the most* important points

SYNONYMS.

Dysentery, Bloody flux Ruhr, Dysenterie, Tormina, Difficultas intestinorum, Rheuma s fluxus ventris, Fluxus cruentus, dysentericus, torminosus, Febris dysenterica

HISTORY.

Dysentery has been known since the most remote period Doubtless however,

appertaining to dysentery

The first reports of tropical dysentery date from the seventeenth century and originate from Bontius, who reported the disease from the East Indies in 1642, and Piso who reported it from the West Indies in 1648

GEOGRAPHICAL DISTRIBUTION.

Dysentery occurs in *all latitudes* Sporadic cases are even observed in the coldest inhabited districts, such as Iceland and Greenland, it therefore oversteps the boundary which is set on malarial diseases, reaching even the highest latitudes It appears sporadically as well as epidemically in all temperate climates But as the tropics are approached it generally gains in frequency and severity It, however, prevails *endemically in tropical* and *subtropical countries only* so that these regions may be regarded as the home of the disease

The following places may be regarded as the *principal centres* of dysentery Asia Minor Syria Arabia India especially the presidency of

especially Bechuanaland, Transvaal Natal), East Africa with the East African Islands (Zanzibar, Madagascar, Réunion, Mauritius the Seychelles), Abyssinia, Soudan and Nubia, a few States of North America (particularly North Carolina South Carolina Georgia) Mexico, Central America, the West Indies a large part of South America (Venezuela, Guiana, Brazil, Paraguay, Argentine Chili Peru) and Polynesia (New

Turkey, Bulgaria and Roumania especially the valley of the Danube

Within this large region of distribution dysentery is not endemic in all parts, very frequently *certain localities* are visited by the disease, whereas other localities in the vicinity, and presenting similar climatic conditions remain free As an instance Singapore enjoys almost absolute immunity, while in the southern point of the Malay Peninsula close by, the disease is common

ETIOLOGY.

Dysentery is doubtless of *parasitic origin*, but the micro organism which originates it is not known for certain It is questionable if dysentery etiologically represents a specific disease

the body and placed on a warm slide. If stained . . .

bacteria on the presence of which their growth appears to depend. Kartulis's observations have been confirmed by Kruse and Pasquale who also made their observations in Egypt and who also regard the amœba as the cause of dysentery at least as far as Egypt is concerned

wh

(n

long duration of 9 cases of acute rated amœbæ in and in thirteen (38 2 per cent) of the chronic cases There seemed to be no relation between the number of amœbæ and the severity of the disease In two of the fatal cases there were but very few amœbæ whereas in several mild cases they were very numerous. Their number widely varied in cases that were clinically similar and in which the

amœbæ and with pure cultures of streptococci Zancarol also produced dysentery

The ætiological influence of amœbæ therefore has thus suffered a severe blow

A *continuously high atmospheric* temperature has great influence on the genesis of dysentery, which accounts for its frequent incidence in the *tropics*, and the dependence of the frequency of the disease on the *seasons* In temperate latitudes, dysentery frequently occurs in the summer and the commencement of the autumn, and it is at these times the epidemics almost always occur The same condition prevails in the subtropical areas In Japan I observed dysentery prevailed mostly during the

Egypt the mor
Kartulis) In the
year the disease
season, and the

commencement of the dry season, i e, during the periods characterised by striking fluctuations in the temperature caused by hot days and cold nights By this variation of temperature chills are caused, which, as we shall see below, play an important part in the etiology of dysentery

The degree of moisture of the atmosphere and the soil is, according to Hirsch, of subordinate importance in the genesis of dysentery

The configuration, geological formation and physical character of the *soil* have no influence

On the other hand the prevalence of the disease is decidedly influenced by latitude Reports are to hand f

such as Java, West ar
which as a rule the r
from diseases of the
valleys near the coast,
is greater at high altitudes

As dysentery often occurs on *marshy ground* conjointly with malaria, it used

One point that Hirsch draws particular attention to is that moist soil indirectly predisposes to dysentery on account of its effect on the temperature, more especially as regards its marked daily changes

In one particular malaria has something in common with dysentery, namely, that both diseases are more frequently observed in *country districts* than in towns.

Dysentery is not *communicable* from person to person, but the *intestinal evacuations*, in which doubtless the infective matter is contained (the
disease In

ther by the
rane of the
rectum.

In most cases infection takes place through imbibing *water contaminated* by fæcal matter In Java between 1869 and 1878 the mortality from dysentery amongst the European soldiers of the Dutch Indian army averaged 13 1,000 In 1875 the first artesian well was sunk, and others soon followed From 1879 to 1883 the mortality from dysentery dropped to 4 2 1,000, and at last from 1884 to 1888 it fell to 0 7 1,000 (Stokvis).

In garrisoned places which have been provided with wholesome drinking water for ten years past, the illness may be said to have disappeared entirely The disease has also decreased considerably in the British and French Colonies in consequence of the improvement of the water supplies

The virus of disease may also be carried by means of *table utensils* or *raw fruits* which have been *contaminated* by the hands of coloured servants suffering from mild or *chronic forms* of dysentery

The *period of incubation* given is from three to eight days Should
it averages only twenty four hours, or but
observed by Lemoine, in
a common night stool by

gy of dysentery Though
than the whites, the cir-
hygienic conditions under

more liable to the disease than adults

As regards *occupation* Davidson asserts that agriculturists are attacked more frequently than persons whose calling is carried on indoors

or superab
severe attac
rhoids, pre
diseases, es

Finally,
dwellings,
ventilated apartments, foul privies, contamination of the soil and drinking water by quantities of fæces, &c, play an important part, and the

Dysentery is not *communicable* from person to person, but the *intestinal evacuations*, in which doubtless the infective matter is contained (the lavatories, night commodes, enemata, &c), can convey the disease In this way the disease can be carried from one place to another

The virus of disease is introduced into the system, either by the mouth or by being conveyed direct to the mucous membrane of the *rectum*

In most cases infection takes place through imbibing *water contaminated* by fæcal matter In Java between 1869 and 1878 the mortality from dysentery amongst the European soldiers of the Dutch Indian army averaged 13 1 000 In 1875 the first artesian well was sunk, and others soon followed From 1879 to 1883 the mortality from dysentery dropped to 4 2 1,000, and at last from 1884 to 1888 it fell to 0 7 1,000 (Stokvis)

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The *period of incubation* given is from three to eight days Should infection take place *per rectum*, it averages only twenty four hours or but little more, as was demonstrated in the cases observed by Lemoine, in which the contagion was caused by the use of a common night stool by the dysenteric and other persons

Racial difference plays no part in the etiology of dysentery Though coloured people are attacked more frequently than the whites, the circumstance is attributable to the unfavourable hygienic conditions under which the former live

In white people the predisposition to the disease increases after a stay of some years in the tropics

Neither *sex* nor *age* afford exemption from the disease Children are

serts that agriculturists are attacked
se calling is carried on indoors
labour in the heat, such as stokers,
cooks, or mechanics are particularly predisposed to the disease Perhaps in the case of stokers and cooks the liability to catch cold no doubt acts as a determining cause

Chills are above all to be mentioned as predisposing causes, as also the eating of rotten and indigestible articles of food, unripe fruits, insufficient or superabundant nutriment, abuse of alcohol—inebriates usually have

of digestion, hæmor
nt through previous

as uncleanly, damp
ons in small badly
the soil and drinking
ortant part, and the
epidemic appearance of the disease is often attributable to several of these causes conjointly with such conditions as overwhelming heat, long lasting drought &c Such epidemics are therefore particularly liable to occur

during *war*, and as an accompaniment to *famine* In almost every long campa gn or siege the outbreak of an epidemic of dysentery amongst the combatants amongst the besiegers as well as amongst the besieged is a common occurrence In rare cases the epidemics assume the character of *pandemics* which usually extend over several years

Recovery from dysentery is no protection from repeated attacks on the contrary the tendency to contract dysentery is increased by the fact of once having had the disease

PATHOLOGICAL ANATOMY

According to Virchow two forms of dysentery are differentiated (1) The *catarrhal* and (2) the *diphtheric*

In the catarrhal form the mucosa and submucosa of the intestine are hyperæmic and infiltrated by a sero purulent exudation When the inflammation attains a higher degree the purulent exudation in places becomes so thick that the tissue breaks down and ulceration sets in as a consequence

views the exuda
bet veen the tissue
ight us the tissues
have become dis

integrated and necrosed with the formation of a material similar to coagulated fibrin The dead t ssues are then shed and more or less extensive ulcerat ons are left

The two forms are however not sharply differentiated for there occurs in both different degrees of the same process of inflammation so that all transitions from the slightest to the severest degree are found side by side This observat on holds good for the dysentery of temperate climates as well as for tropical dysentery

The *large intestine* is mostly the *seat* of the d sease, being often

ly also the lower part of
In very rare cases the
parture of the diseased
or by the rectum As

Virchow first pointed out the flexures (hepatic spleen and sigmoid) exhibit the most developed stages of disease that is places where masses of fæces generally remain the longest and therefore are wont to irritate the inflammed mucous membrane most

even or it becomes most marked at the edges of the prominent folds

and œdematous If at this stage of the disease recovery ensues, no cicatrices are left, but a diffuse—more rarely punctiform, slatey pigmentation remains

At more advanced stages of the disease more or less numerous diseased patches are seen on the hyperæmic and swollen mucous membrane, varying in size from a few millimetres to several centimetres The patches are at first not deeply coloured and have no gloss, but later they become deeply discoloured or blackish, here and there they appear as if covered with a grey slough When these sloughs are shed *ulcers* are left, the size and form of which vary considerably The depth also varies, sometimes the ulcers only extend to the mucosa, sometimes they penetrate the *sub mucosa, the muscular coat,* and *even the serous* membrane so that perforation of the intestinal wall may ensue

Besides these ulcerations due to superficial or deeply situated necrosis, other ulcers the size of a pin s head or a little larger, are met with, these are distinguished by their round form and sharp edges, and are

of the intestine

In the most severe form of the dysenteric process, in so called *gangrenous dysentery,* the mucous membrane becomes extensively disintegrated and is occasionally shed in large, gangrenous patches, or even in the form of long cylindrical masses Occasionally the large intestine forms a continuous ulcerative surface, from which only here and there

may *heal* In that copious quantities y scars takes place ar tissue that has

perished

When the ulcers are large, the process of healing as may be imagined, proceeds very slowly and in consequence the disease assumes a chronic course (*chronic dysentery*)

In chronic dysentery, instead of the hyperæmia that was present formerly, the mucous membrane is found to be pale or slate coloured, it is thickened in the vicinity of the ulcers, and the solitary glands are atrophied usually shrunken and its wall someti ickened and lardaceous The gut is organs by inflammatory adhesions The cicatrices originate strictures in consequence of their contraction, especially if they be ring shaped, and above the strictures gradual dilatation of the intestinal canal and hypertrophy of the muscular coat develop The mucous membrane of the small intestine, the loops of which may be adherent to one another, is often pale or slate coloured and the lymphoid constituents, as also Lieberkuhn s follicles, appear atrophied

In *amœbic dysentery* the process of disease according to Councilman and Lafleur ... commences in the *sub-mucosa* In ... formed These ... s The mucous ... degree so that typical ulcers with undermined edges ensue The mucous membrane at the same time is catarrhal and exudes a great deal of mucus

According to Kelsch also, the sub mucosa is the chief seat of the inflammation The

vessels leading to the mucous membrane are involved in the cellular infiltration which invades the sub mucosa leading to necrosis with consecutive ulceration in the mucous membrane

As to *affections of other organs* in consequence of dysentery, it must first be mentioned that the *mesenteric glands* as a rule are hyperæmic and swollen, and become pigmented in later stages or permeated by pus, or present caseous foci

The *liver* may be of normal size or it may become enlarged and hyper æmic and the seat of simple or multiple abscesses In chronic dysentery the liver is often in a state of fatty degeneration and in other cases it appears atrophied or cirrhosed

In the *spleen* embolisms, areas of softening and even abscesses are met with

The *kidneys* in chronic cases often show inflammation of the paren chyma, or more or less atrophy

In protracted cases *metastatic inflammations* such as purulent parotitis, pericarditis, pleursy gangrenous erysipelas thrombosis of the veins with suppurative disintegration gangrene and noma are met with

SYMPTOMATOLOGY.

Three forms of dysentery are differentiated clinically (1) the *catarrhal*, (2) the *gangrenous*, and (3, *chronic* form

1 Catarrhal Dysentery.

Diarrhœa, it may be of a choleraic type and accompanied by general indisposition may precede an onset of catarrhal dysentery In the mildest abortive form the disease may not go beyond the stage of these prodromal symptoms

In other cases the onset of the disease is sudden *Abdominal pains*, situated mostly in the umbilical region, set in generally at night or early in the morning, and *tenesmus* and the *typical intestinal evacuations* accompany the attack

The motions to commence with are fæculent, soon, however, the

more frequent and the abdominal pains and tenesmus increase in intensity In the milder cases the number of stools in the twenty four hours averages ten to twenty, in serious cases fifty to sixty in twenty [illegible]

particles are cast off shreds of mucous membrane, or when examined microscopically are found to be composed principally of red blood corpuscles, pus, and intestinal refuse embedded in a viscid slimy material (Heubner)

In amœbic dysentery Charcot Leyden s crystals are sometimes found in the stools (Kartulis Councilman and Lafleur Römer)

The frequent evacuations cause irritation or actual inflammation of the anus, which in consequence becomes the seat of burning pains

Sometimes prolapse of the rectum occurs or tenesmus of the neck of the bladder with consequent dysuria and strangury

The abdomen is but rarely distended, in severe cases it is painful on pressure, particularly in the right or left iliac regions Pruner and Heubner have directed attention to the peculiar resistance similar to that of an india rubber tube with fairly thick walls assumed by the intestines in the diseased portions

suitable treatment

The tongue is covered by a white coating There is generally loss of appetite and intense thirst vomiting is not frequent In some cases the patients exhibit slight jaundice The urine is scanty and concentrated, it is usually free from albumen, the chlorides are diminished

The fever accompanying the disease is, as a rule, not high or may be entirely absent Nevertheless the patients strength rapidly decreases

If correctly treated the disease rarely lasts longer than a week In some cases, however it is prolonged over several weeks

2 Gangrenous Dysentery

Gangrenous dysentery is either an outcome of the catarrhal form, or commences insidiously as fæculent diarrhœa accompanied by slight abdominal pain and tenesmus After a few days mucus and blood appear in the stools, and the abdominal pain and tenesmus become more and more severe The stools consist of a brownish red or blackish slimy

of

s

mucus The intestinal evacuations are remarkably frequent the number averaging 150 to 200 in the twenty four hours, so that the patients are literally unable to rise from the commode Sometimes large quantities of pure blood are passed and death may even ensue from hæmorrhage Fayrer has pointed out that occasionally the stools are pulpy, and appear to contain neither mucus nor blood, they, however, give off a horribly

and frequent

Before death stools are passed involuntarily, so that on approaching the patient s bed a sickly cadaverous odour is experienced

Sometimes, as in cholera, algide symptoms such as copious stools, anuria muscular cramps, hoarse voice, singultus, and precordial agony precede the fatal issue

In other cases in which septicæmia is a concomitant of the dysentery, *typhoid symptoms* set in The temperature rises sometimes after an initial rigor or with repeated *fits of shivering, and assumes a continued* or remittent type The tongue becomes dry, the mouth foul, and the breath fetid Cerebral symptoms set in, at first in the form of restlessness and persistent dreams, but later on delirium and stupor supervene These symptoms may be accompanied by peritonitis or purulent paro

titis carbuncles, putrid abscesses in the vicinity of the anus, decubitus, gangrenous erysipelas, &c, the patients mostly dying of extreme prostration

Death which generally occurs in the second week of disease, or even later, is mostly due to exhaustion more rarely it is due to pyæmic or septicæmic infections, intestinal hæmorrhages perforation of the bowel, peritonitis or other complications In many cases the fatal issue occurs rapidly after even a few days illness

3 Chronic Dysentery

Chronic dysentery is for the most part a sequel of the acute form and tropical dysentery has the tendency to become chronic in a far greater degree than either sporadic or epidemic dysentery After actual or only apparent recovery from acute dysentery relapses may occur and these [illegible]

a rule the motions are frequent five to six daily or they may not exceed two or three in number they are thin, sometimes quite watery, of various tints and often give off a foul repugnant odour and contain mucus blood and pus in various combinations Occasionally small pieces resem [illegible] consist partly [illegible] les a fact [illegible] so inter [illegible] blackish red colour Firmer masses of fæces and undigested ingredients of food (lienetry) are frequently found in the stools Pain and tenesmus are but slight or may be entirely absent Occasionally diarrhœa alternates with constipation and the stools may continue to even assume a normal condition for a short time

The appetite is sometimes bad sometimes on the contrary very large and frequently alternating The tongue is red and smooth and deprived of its epithelium the abdomen is sometimes distended with wind and sometimes flattened there may or may not be vomiting Bronchial catarrh has occasionally been noted (Kartulis)

If untreated the disease may drag on for mouths and years the patients becoming more and more emaciated and anæmic

Sometimes hæmorrhages set in especially in the skin and from the nose Finally profuse night sweats œdema and bed sores develop and the patients die from general exhaustion or succumb to a complication such as pneumonia Bright s disease or perforating peritonitis

Should the ulcers heal, *stricture of the bowel* with consequent intestinal disorders often remain

The *amœbic dysentery* of Councilman and Lafleur is distinguished by a tendency to a chronic course interrupted by exacerbations and remissions

The most frequent *complications* observed are *inflammatory symptoms* affecting the liver These may accompany dysentery follow it or even precede it and are indicated by nausea, bilious vomiting yellow and green stools or motions without bile heaviness, tension and dull pains in the right hypochondrium, pains in the right shoulder, enlargement of the

liver, and sometimes icterus. These disorders may again disappear or may lead to the formation of *hepatic abscesses* (see the next chapter). Hirsch compiled the histories of 2,377 cases of dysentery with a fatal issue, of which 19.2 per cent exhibited hepatic abscesses. The frequency of hepatic abscesses associated with dysentery varies in different countries,

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especially in the tropics, but it also appears in temperate latitudes under the unfavourable hygienic conditions which obtain at times in camps, hospitals, prisons, &c. Besides the characteristic affection of the mouth, hæmorrhages in the skin, stools of pure blood and sometimes even vomiting of blood are observed.

During the course of dysentery, or perhaps during convalescence, and more frequently in milder than in the severe cases, *arthritis* with or without effusion occurs. The affection of the joint resembles closely the condition met with in articular rheumatism, and is probably due to a secondary infection with pus cocci. As a rule more than one joint is affected and occasionally even a great many. The ankle and knee joints are most frequently attacked. This complication usually drags on for months and in exceptional cases leads to anchylosis or suppuration of the joint. Cardiac complications are rarely observed in post-dysenteric arthritic ailments.

Occasionally *intussusception of the intestine* is observed in dysentery. This is recognised by the lack of any fæcal constituents in the stools attended by vomiting at first bilious and then fæculent, flatulence and collapse.

During the course of convalescence *relapses* occasioned by errors in diet, chills, &c., are frequently observed, especially in patients who have been weakened by previous disease, by the abuse of alcohol or by too long a stay in the tropics. Generally after recovery from dysentery the intestine remains permanently irritable and inclined to diarrhœa.

Finally, it may be mentioned that in rare cases, *paralysis*, the consequence of more or less extensive inflammation of the peripheral nerves, occurs in dysentery as well as in other infectious diseases, especially diphtheria. Beri-beri even, as we have observed, may become a complication of dysentery. H. Lenhartz, in one case, observed *ataxia* and *aphasia* in intimate conjunction with the disease and ascribed the cause to an inflammatory process extending to the brain, the medulla oblongata and to the spinal cord. The *percentage of mortality* in dysentery varies

(1884 1890)

According to Roux, from 40 to 70 per cent. of persons suffering from chronic dysentery succumb to the disease.

DIAGNOSIS

In most cases the diagnosis of dysentery offers no particular difficulties; one should, however, never neglect to inspect the evacuations. Dysentery

has to be diagnosed from the lesions which occur in such ailments
catarrh of the large intestine, proctitis, hæmorrhoids, rectal pol
syphilitic processes and carcinoma of the rectum (examination of the
and rectum), intussusception of the intestine (especially in child
bilharzial disease (hæmaturia, proof of ova in the stools)

The differentiation between *chronic dysentery* and *chronic diarrho*
however, occasionally more difficult In the differential diagnosis
history of disease (acute dysentery having preceded) the preser
tenesmus and the condition of the stools must be taken into acc
mucus is rarely absent from the stools and blood and pus are fou
times

Bertrand and Fontan *identify chronic dysentery with chronic diarrhœa* Th
toms and pathological anatomical changes in both d seases accord ng to these o
are the same In chronic diarrhœa mucus ar d blood are occas onally foun
stools and ulcerations of the intestine are met with *post morten* If the
starts in the small intestine the illness commences with diarrhœa whe
originates in the large intestine dysenteric symptoms are present from the co
ment If during the course of the disease the process advances from one p
bowel to the other m xed symptoms of entero colitis develop under w
Bertrand and Fontan describe both diseases These authors do not rega
aphthæ (sprue) as a specific disease but are of opin on that the cl aracter
affection found in sprue may be present or absent in chronic entero coliti
also occur in other chronic ailments such as tuberculosis

According to Kaufmann the *pilgrims diarrhœa* which frequently
amongst the pilgrims returning fr m Mecca—u ually at the quarantin
El Tor on the Red Sea—comprises two different intestinal diseases which
classes as (1) chronic diarrhœa and (2) a peculiar d sease of the large intest
further investigation Imported cases also appear in Egypt Kaufmann
cases found at the autopsy that the entire length of the large intestine
of inflammation The mucous membrane was loosened the glands were
irregular, small sl ghtly raised red points were apparent everywhere
these there were greyish yellow mucous masses (not of a diphtheric n
masses conta ned microscopically red blood corpuscles epithelial cells

PROGNOSIS

The prognosis of dysentery depends upon the *age* and
the patients and on the *form* of the disease

Sucl lings old people persons enfeebled by previous
inebriates, are particularly endangered Pregnant wome
dysentery will, according to Van der Burg probably miscar
suffer severely after the expulsion of the fœtus

As to the different forms of the disease the prognosis
the *catarrhal form* death seldom occurring in this variety
the prognosis of *gangrenous dysentery* is in gener
hard, the prognosis of large and numerous pieces of cast of
more especially if large and numerous pieces of cast of
are contained in the stools Severe hæmorrhages violen
lysis of the sphincter ani foul tongue thrush great une
convulsions (in children), hiccough, precordial agony
symptoms and metastases are all to be regarded as
signs In *chronic dysentery* the prognosis is decided b
the disease, the severity of the symptoms and the ge
the patients

PROPHYLAXIS

The circumstance that dysentery does not now appear in the tropics with the frequency and severity of thirty to fifty years ago, is to be ascribed to the improvement in the hygienic conditions, especially in regard to water supply, that has taken place during recent years, and to the more rational methods of treatment practised by the doctors of the present day

In order to avoid the disease spreading the intestinal evacuations, in which doubtless the infective material is contained, should be *dis infected* as should also night commodes, utensils, privies, &c, as well as the soiled body and bed linen used by the sick

In indigestion the use of mild aperients is recommended Zancarol advises that cold baths should be taken prophylactically throughout the entire year

TREATMENT.

The principal drugs used in the treatment of dysentery are *calomel* and *ipecacuanha*, the effect of which does not depend solely upon their aperient and emetic qualities These drugs must be regarded as having a *specific* effect, a fact that does not seem as yet to have been fully [illegible] German text books are concerned [illegible] by Annesley in the treatment of [illegible] y the French in Algiers, is used in [illegible]quently repeated doses, sometimes in *larger doses taken more rarely I made use of the latter method and can* recommend it warmly as the result of my experience in Japan I administered calomel in doses of 0 3 to 0 5 every four to six hours, and if constipation occurred meantime one or two tablespoonfuls of castor oil were administered *On an average a total of 3 0 to 4 0* calomel sufficed to effect a cure The largest quantity that was ever necessary was 9 0 It was well borne throughout the disease, and never caused the development of stomatitis

When larger doses of calomel were necessary, mouth troubles were avoided by thoroughly cleaning the teeth, and rinsing the mouth with chlorate of potash

Kartulis favours the administration of frequently repeated small doses He prescribes 0 05 to be taken ten or twelve times in twenty four hours for several days [illegible]
Recently, he g[illegible] p
tion being as fo[illegible] n
F dos No x ad caps amyl S One capsule every hour

In *gangrenous dysentery*, according to Dr Manson and A Davidson, calomel is *contra indicated*

Ipecacuanha, which in 1618 was brought by Piso to Europe from Brazil, where it had been used in the treatment of dysentery, has been principally used *in India According to Fayrer the mortality of the* British army, which was 11 per cent before its use fell to 5 per cent after its introduction The method of administering ipecacuanha adopted in India is in most essentials that recommended by Dock in 1858 If constipation is present a dose of castor oil or some other mild aperient is first given, and then [illegible] form or in cachets, or in a little [illegible] up, a mustard poult[illegible] sprinkled with oil of [illegible] twenty to thirty dro[illegible]

of morphia is given half an hour before the dose of ipecacuanha The patients must lie still in a horizontal position and take no food or drink for three or four hours If, notwithstanding these precautions there should be a tendency to vomit this must be combated by giving little pieces of ice to suck If vomiting sets in soon after the administration of the ipecacuanha a second dose should be given In mild cases the dose is repeated morning and evening in severe cases every eight hours and the treatment is continued until the abdominal pain and tene mus have disappeared and the stools have become fæculent In the mildest cases one or two doses are sufficient to effect a cure, in serious cases the treatment must be continued for several days

In the gangrenous form ipecacuanha should be tried first of all

[illegible]

adm nistered

As the usefulness of ipecacuanha is frequently frustrated by its emetic properties (caused by the alkaloid emetin conta ned therein) preparations liberated from this element have been produced of these preparations *radix ipecacuanha s ne e net na* (Merck) has proved most useful (Kanthack and Caddy

Op nions differ as to which of these drugs merits the preference I personally prefer *calomel* Accord ng to my experience when it proved useless ipecacuanha was also given without results Though calomel and ipecacuanha have a positive effect in catarrhal dysentery, they have but little effect in the gangrenous form and according to my opinion the same is the case in chronic dysentery Roux in chronic dysentery has observed favourable results in cases not too far advanced from a com bination of ipecacuanha calomel and opium in the form of Segond s pills The formula is as follows Rad ipecacuanha 0 4 calomel 0 2, extracti opii 0 05 syr rhamni catharticæ q s ut f pil No vi s to be taken in twenty four hours The e are taken for three days there is then an interval of three or four days when they are again taken for three days and so on

The following are some other remedies used in dysentery —

Castor oil, which has already been mentioned of which two to four tablespoonfuls per diem are given during the first days of d sease and later it may be repeated Hillier also recommends it in chronic dysentery in smaller doses in conjunction with tincture of opium the dose bei g 4 0 to 8 0 castor oil to 4 to 10 drops of tincture of opium, three times a day

Saline aperients, especially sulphate of soda and sulphate of magnesia, *for which French doctors have a special predilection* Magnesium sulphate has also recently gained great renown in India and the British doctors even prefer it to ipecacuanha Magnesium sulphate (Epsom salts) is used in a saturated solution, of which even in chronic dysentery, 4 0 to 8 0, with a few drops of diluted sulphuric acid is given every one or two hours Buchanan s prescription is as follows Magnes sulp 60 0 acid sulp dil 12 0, tinct zingib 12 0, aq ad 240 0, this is continued for two

or three days after the mucus and blood have disappeared from the stools and it is recommended if the stools again become dysenteric If there is constipation in chronic dysentery, castor oil or Carlsbad salts or Carlsbad water are the most suitable aperients

After convalescence from dysentery it is advisable to take Carlsbad water as an after treatment for a few weeks

days which Schwarz advises

Ixora dandraca and *hedysarum* are drugs in use in India for dysentery

Tuphmi lunga is an Indian seed soaked in water, the decoction from which drunk *ad libitum*, is recommended by Fink

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hours

Bismuthum subnitrate and *salicylin* (Gehe) have been recommended for chronic dysentery in large doses (up to 1 0 every hour) with or without opium A Plehn administers the bismuth from the fourth day (calomel previously) 0 5 being given twelve times during the day Dr Manson and A Davidson usually give *oleum terebinthinæ* in gangrenous dysentery wh
or
eve
of
recommends the same remedy in chronic dysentery as follows 20 drops of ol terebinthinæ to be given every three or four hours usually with small doses of opium Kartulis recommends it in chronic dysentery when there is tympanitis

Naphthalin was first used by Rossbach in the treatment of acute and ...es daily, the maximum for
ed it for dysentery The
phthal puriss, sacch albi
art æq No xx s 5 10
up to
1
He
gave doses of 1 0 or 2 0, up to 6 0 or 8 0 per diem It may be given in wafers or dissolved in warm oil or castor oil worked to an emulsion with gum arabic and water or aqua chloroformi with the addition of a little aq menth pip Fisch and Kartulis observed that favourable results followed the use of salol

The use of *local medicaments* in the form of enemata, suppositories and the washing out of the large intestine, is often indicated in conjunction with the salol internally

Enemata of decoctions of linseed, or *starch enemata* with or without *tincture of opium* are often used for the relief of violent tenesmus For tenesmus warm sitz baths often render good service

During the first part of the disease Minerbi used *naphthalin* in the form of enemata several times daily (5 0 with ol olivæ 20 0)

Fisch strongly recommends *iodoform* enemata in chronic diarrhœa 0 25 to 0 5 iodoform is well mixed with 1 or 1½ tablespoons of barley or oatmeal water, and the mixture injected high into the intestine by means of a long india rubber tube fitted on to an ordinary enema syringe

Olive oil enemata (120—240 g) are recommended by White for con stipation

In obstinate chronic cases Hillier uses enemata of milk

Astringents and *antiseptics* are especially used for washing out the intestine (enteroclysis) Tannin (0 5—1 per cent) and nitrate of silver (0 1 per cent) are especially recommended as astringents, and salicylic acid (1 300—1,000) as an antiseptic Carbolic acid and corrosive sublimate are quite unsuitable for this purpose being capable of causing symptoms of poisoning

In order to wash out the intestine the patient should assume a lateral or knee and elbow position and an india rubber tube (œsophagus tube) well oiled is introduced at least 8 cm into the bowel and one or two litres of tepid or warm fluid thrown up These injections are usually given once or several times daily They are particularly indicated in *chronic dysentery*

For acute dysentery Gastinel recommends that the intestine be washed out with permanganate of potash (0 5—1 0 1) in addition to treatment by calomel F Plehn advises irrigations with a weak infusion of tea with the addition of red wine and the subsequent introduction of 1 0 subnitrate of bismuth in 50—100 ccm water three to four times daily in the acute stage, and once in the chronic

Suppositories with *narcotics* such as opium morphia extract of bella donna, cocaine &c have proved of service in severe tenesmus Minerb uses suppositories with *naphthalin* (0 5—1 0 with ol Theob 10 0)

In regard to the treatment of *particular symptoms and complica tions collapse* is combated by stimulants internally and hypodermics (ether &c

Intestinal hæmorrhages should be treated by the application of ice the abdomen and the use of enemata with iced water ergotin and liqu ferri perchloridi

When *perforation* of the *intestine* is threatening ice and large do of opium are ordered After perforation surgical interference will necessary in addition to treatment with opium

Surgical operations have recently been tried in the treatment of dysentery Shanghai according to Tedelius the tenesmus is frequently successfully relieve incising the sphincter ani Stephan and Van S hilfgaarde in one case of obst dysentery, performed colotomy in the left iliac region through the artificial they successfully treated the diseased parts of the intestine when the artificial was closed Godlee and Balance (*Lancet* 1895 Dec 21 p 1579) also each ope on a case the patients improved but subsequently succumbed to other diseases.

For *disorders affecting the liver* local bleeding is recomme 10 to 20 leeches are applied to the anus or to the abdomen alo course of the large intestine (Roux)

The *anæmia* and *weakness* remaining after dysentery require t of iron and quinine and suitable diet *paralyses* must be trea strychnine (subcutaneously) and electricity

Dietetic treatment is of the greatest importance and should al hand in hand with other remedies In *acute dysentery* only f must be taken until an improvement occurs Boiled milk taken lu is the best and if the patient cannot take it pure, the addition o soda water, lime water (a tablespoonful to the cup) or even a l is permissible

give
thin
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one litre of water and the addition of a little syr aurantii When the dysenteric symptoms have disappeared, soft boiled or raw eggs, digestible meat foods, &c may be taken

As to *drinks*, rice water, barley water, toast water and almond emulsion, all taken lukewarm, will be found most suitable Alkaline mineral waters (Vichy, &c) are well borne by the patients Spirits are strictly prohibited

In *chronic dysentery* a *pure* milk cure is most suitable first of all, later on its place may be taken by a digestible but strengthening diet Fayrer recommends that plenty of bael fruit be eaten, Fisch advised that a jar of preserved bilberries be taken daily

In acute dysentery and in exacerbations of chronic dysentery, the patient must be kept in bed and must always be wrapped up warmly Poultices, hot Priessnitz s compresses on the abdomen, or hot water bottles render good service

Warm baths also, do the patients good, but in using these great care must be exercised to avoid chills

Finally, it must be mentioned that in chronic dysentery a *change of climate* frequently has good results Patients who are unable to return to Europe should at all events try a sea voyage Cold and mountainous places are less suitable, in Egypt the desert (Heluan) is resorted to After the return home, treatment by waters at one of the spas, Carlsbad, Marienbad, Kissingen, Wiesbaden, or Tarasp is strongly recommended

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III

TROPICAL HEPATITIS.

DEFINITION.

Hepatitis is a disease of the liver that occurs principally in warm countries, it is characterised by an inflammatory enlargement of the organ which either resolves or tends to suppuration The disease either appears *idiopathically* or, which is more frequently the case, *secondarily* to dysentery

SYNONYMS.

Liver abscess Hepatic abscess, hépatitis suppurée suppurante, abcès du foie, hepatitis vera circumscripta s suppuration

HISTORY.

Hepatitis has been known since the earliest period of medical history The significance of inflammation of the liver was however obscure to ancient pathologists, for not only were all diseases of the organs in which pain occurred comprehended under the term, but many other affections of organs in the vicinity of the liver were confounded with it

[illegible]

Morgagni's investigations have especially served to elucidate the subject of hepatitis Our knowledge has been still further enhanced during the nineteenth century by numerous reports from medical men who had opportunity to observe hepatitis in warm countries, Twining Annesley, Budd Catteloup, Cambay Haspel, Waring Morehead, Rouis, Dutroulau, Sachs and Fayrer have earned distinction in this connection

GEOGRAPHICAL DISTRIBUTION.

Hepatitis occurs mostly in *tropical and subtropical countries* India is one of its principal seats, and especially on the Coromandel Coast and on the declivities of the eastern Ghauts is the disease prevalent In Ceylon it is frequently observed, and it also occurs in Further India, especially in Burma, and in the Malay Peninsula, it is less frequent in

In Africa the disease is endemic in Algiers, the province of Oran being very severely visited, whilst the province of Constantine on the other hand is but slightly affected The disease, moreover, occurs in Egypt, Nubia, on the West Coast of Africa, and in Madagascar and Mauritius

In the Western Hemisphere the west coast of Mexico, Central America, Venezuela, Peru and Chili are the regions where hepatitis prevails most severely, while it is relatively rare in Guiana and Brazil and on the Antilles

Hepatitis is not common in Polynesia, but in New Caledonia a more important centre of the disease has been recorded

A few tropical regions, such as Singapore, the Sandwich Islands and

ribution of hepatitis covers the same essentials Kelsch and Kiener justly
ia ni foyer endémique ni épidémies propres, partout et toujours elle accompagne la dysenterie' The frequency of hepatitis, however, does not everywhere and always correspond with the prevalence of dysentery, in some countries and in some epidemics dysentery is more often followed by hepatitis than in others As an instance dysentery is very common in the West Indies, liver abscess on the other hand is almost unknown

ETIOLOGY.

In accordance with our modern views of inflammation, hepatitis, ending in suppuration, can only be caused by *micro organisms*, and in confirmation of this opinión the various microbes which are considered to be the excitants of suppuration have been found in the pus of liver abscesses

The micrococci which set up suppuration can reach the liver in two ways —

(1) From intestinal ulcers they may reach the liver by the portal vein, (2) or they may reach the liver by the bile ducts. The veins from the bile ducts enter the portal vein and should the bile passages be ulcerated or blocked the bacteria that have penetrated from the intestine may reach the liver by hannel (Accorimboni)

It is believed t temperate climates are caused by bili Hepatic infection from inte are how ever, of greater importance forming mucou t cause of hepatitis This view was first expounded by Budd but it was subsequently disputed and has only qu te recently again gained more believers According to Kartulis observations which extend over more than 500 cases of hepatic abscess, 55 to 60 per cent are of dysenteric origin Zancarol who reports on 444 cases observed that dysentery had pre- and Waterman compiled 693 cases from dysentery had

attention to the c

exhibited no symptoms of dysentery and wi suffered therefrom the autopsy occasionally reveals ulcers or cicatrices indicative of that disease The percentage of cases caused by dysentery, and which include cases of recovery are according to statistics as yet low, confirmation of the theory is dependent solely on cases that examination examined the more limited atic abscess become abscess being so frequently associated with dysen and so rarely with others especially typhoid to the circumstance that the former in contradistinction to the latter are often accompanied by submucous suppurations

Hepatitis sometimes follows closely on dysentery but sometimes weeks months or even years (up to ten years, Josserand) elapse before

siders it to be due to a muco frequent relapses and rarely te ds to recovery

on several points which seem to oppose ery and liver abscess temperate climates

(2) The frequent occurrence ease in Europeans living in the tropics and its rarity amongst natives

(3) The fact that women and children are rarely attacked.

(4) The observation sometimes made that hepatitis may precede dysentery

In regard to the first point it must be mentioned first of all that dysentery in the tropics is generally more severe than that of temperate latitudes, and above all exhibits a greater tendency to become chronic, and it is essentially chronic dysentery that tends to give rise to hepatitis

This explanation is, however, not quite sufficient to explain the great

frequency of liver abscess in the tropics and its rarity in temperate climes. *Warm climates* have certainly an important bearing on the prevalence of the disease As mentioned previously most authors agree that more or less pronounced *hyperæmia of the liver* is apt to develop in Europeans generally soon after their arrival in the tropics from the temperate zone, in consequence of the continuous high temperature This condition is at first accompanied with increased secretion of bile (sometimes bilious morning diarrhœa), and later diminished secretion of bile, and followed by several subjective disorders In addition, the Europeans, notwithstanding the fact that their muscular energy and expenditure are apt to be diminished in the tropics, often retain their former style of living They do not decrease the quantity of food and drink they were wont to partake of, they take too much nitrogenous food such pungent substances as spices, strong coffee, and above all, spirituous liquors, thereby still further increasing the hyperæmia of the liver It follows that after every meal temporary hyperæmia and enlargement of the liver occurs and in the course of years there gradually develops a *hypertrophy of the liver*, that is to say, a hypertrophy of the connective tissue with atrophy of the glandular tissue The result is that after meals there is a feeling

the British, and the condition later on tends to *cirrhosis* Such hyperæmic or hypertrophic livers are of lessened functional value, and predispose to the development of abscesses

Of all causes mentioned *alcohol* is the most deleterious, and in the tropics its effects are even more injurious than in temperate climates

n of alcohol plays an important part
rding to Manson, 65 per cent of
inebriates The illness is certainly
ers, and the fact that the disease is
e as it was twenty years ago is no

doubt owing at least partly, to the fact that during recent decades the manner of living of Europeans in the tropics has become more moderate Another reason also is afforded by the improved hygienic conditions having caused a decrease of dysentery The fact that the French are as a rule, more moderate in their use of spirituous liquors than the English,

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Buchanan during the years from 1893 to 1896, there were 1,512 cases of dysentery amongst the European soldiers in India, with 441 cases of liver abscess there were 79,723 cases of dysentery, and 127 cases of liver

dysentery

Generally the cause of this relative immunity of the natives may be ascribed to their abstinence from spirituous drinks In the larger towns of India and other places where natives have acquired the customs, as also the bad habits of Europeans, hepatitis is more frequent among the native population Thus Daniels reports that since brandy has become an article of barter with the natives of West Africa inflammation of the [illegible] amongst them

[illegible]

may elapse after return to a temperate climate before the disease is exhibited

[illegible]

Rouis in Algiers, eight, *i e*, 3 1 per cent were females Nevertheless, as these numbers are gathered from military colonies, the percentage is decidedly too low Sach s computation, gathered from a population consisting of an equal number of men and women is nearer the truth, of 111 Egyptian cases compiled by this author, six *i e*, 5 3 per cent only, occurred in females

As regards *age*, liver abscess rarely attacks children The cases are more frequent after the fifteenth year and most of the illnesses occur between the ages of 20 and 40 It is also rarely observed in aged persons

According to my opinion the observation made by Annesley that hepatitis sometimes precedes dysentery instead of following it, requires more confirmation, particularly in regard to previous attacks of dysentery from which the patients had recovered It must also be taken into consideration that, as mentioned above dysentery in some cases has a latent course

[illegible]

ings, than amongst other Europeans

According to Smith hepatic abscesses are also observed in India amongst *horses*

PATHOLOGICAL ANATOMY.

In the first stage of the disease the liver is enlarged, hyperæmic, dark red or reddish brown and soft Later on a greyish or yellowish spot about 1 or 2 cm in diameter, is found on the incised surface of the liver from which a reddish or slightly purulent fluid exudes The lobules are obliterated and the hepatic cells become granular, containing drops of fat and grains of pigment From these *necrotic* patches *abscesses* develop in consequence of further disintegration and suppuration The contents

of the abscesses rarely consist of pure pus, but are chocolate coloured, mixed with blood, viscid and thick, and under the microscope exhibit, besides the micro organism above mentioned, red blood corpuscles, pus corpuscles, *débris* of hepatic cells, shreds of cellular tissue and hæmatoidin and cholesterin crystals Kruse and Pasquale likewise found numerous Charcot Leyden crystals Sometimes the pus is of a greenish colour in consequence of an admixture of bile The pus has usually no odour, but occasionally the proximity of the large intestine imparts a fæcal smell to it The wall of the abscess, which is of a

the cavity of an abscess The area around an abscess is frequently hyperæmic and infiltrated while the remaining parts of the organ mostly exhibit no hyperæmia When the local process of disintegration has come to a standstill the abscesses are surrounded by a firm fibrous layer that varies in thickness from a few millimetres to several centimetres

The size and number of abscesses which may be present in any single liver differs

60 2 per cent were single abscesses and 39 8 were multiple The dif ference, however between the two forms is not absolute, for several large abscesses may often be present, and some one of the multiple abscesses

and other characteristics as older than the other, so that the more recent abscesses must be regarded as metastases which have come into existence from the older abscess by thromboses of branches of the portal vein Neighbouring abscesses may intercommunicate

The abscesses occasionally attain large dimensions Fayrer drew off by tapping 4 5 kg of pus out of one abscess Vaughan operated on a case which yielded 8 litres It is even possible for an entire lobe or even an entire liver to be transformed into one abscess cavity, the walls of which are relaxed resembling those of a cyst and leaving but little actual hepatic tissue to be recognised

Roux compiled 639 cases in 453 of which (70 8 per cent) the right lobe in 85 *(13 3 per cent) the left lobe and in two (0 3 per cent)* the lobulus spigelii was affected The overwhelming majority of cases in which the right lobe is affected is probably due to the fact of its being much larger than the left one

Should the abscesses have their seat on the surface of the liver they may form prominences of various sizes

Frequently the liver is adherent in the neighbourhood of *the abscess to the* ... stomach or the intestine

The termination of hepatic abscess varies Apart from being artificially

opened, it may open spontaneously after adhesions have formed in several

The abscess bursts into the lung most frequently and into the pericardium most rarely

As to the frequency with which the rupture of the hepatic abscess takes place in various directions the following table, compiled by Rendu, and taken from Roux, gives particulars —

Authors	Number of Cases	Rupture into									
		Pericardium	Pleural Cavity	Lung	Abdominal Cavity	Colon	Stomach and Duodenum	Bile Ducts	V Cava	Kidney	Ilio-lumbar regio
Waring	300	—	14	23	15	2	1	1	3	2	2
Dutroulau	ℂℂ		2	10	7	1	1		—	—	4
Rouis	162	1	11	17	14	3	6	2	—	—	—
Haspel	25	—	4	2	-	—	—		—	—	—
Cambay	10	—		1	1	—	-	1	—	—	—
	563	1	31	59	39	6	8	4	3	2	ℂ
	Per cent	0·13	5 5	10 5	6·9	1	1 4	0 7	0 5	0 3	1

It sometimes happens that the abscess becomes encapsuled and the contents may become caseous or calcified The general opinion is that in excessively rare cases they *heal spontaneously* through the cavities contracting concentrically, their contents becoming absorbed, the walls coalescing and leaving cicatrices with ray like processes Of course it is quite possible, that scars of this kind that have been found at autopsies and which have been pronounced to be healed abscesses may really be of syphilitic origin It must also be borne in mind that in cases of spontaneous cure it is not improbable that recovery has taken place by the pus escaping by way of the bile ducts (Roux)

In regard to the *remaining pathological changes* met with in hepatitis peritonitis, pleurisy, pneumonia and pericarditis, with their sequelæ, may

such as the lungs, spleen or kidney

SYMPTOMATOLOGY.

Hepatitis often starts suddenly with an attack of shivering, or a slight rigor In other cases the disease is preceded by a sensation of indisposition for several days The rigor is followed by fever, which

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fulness and pain in the right hypochondrium The pain is described as

of the abscesses rarely consist of pure pus, but are chocolate coloured, mixed with blood, viscid and thick, and under the microscope exhibit, besides the micro organism above mentioned, red blood corpuscles, pus corpuscles, *débris* of hepatic cells, shreds of cellular tissue and hæmatoidin and cholesterin crystals Kruse and Pasquale likewise found numerous Charcot Leyden crystals Sometimes the pus is of a greenish colour in consequence of an admixture of bile. The pus has usually no odour, but occasionally the proximity of the large intestine imparts a fæcal smell to it The wall of the abscess, which is of a symmetrical and almost globular shape is spongy, and consists of necrotic *hepatic tissue, while the process of disintegration is in progress* Occasionally vessels with thickened walls are seen running string like across the cavity of an abscess The area around an abscess is frequently hyperæmic and infiltrated, while the remaining parts of the organ mostly exhibit no hyperæmia When the local process of disintegration has come to a standstill the abscesses are surrounded by a firm fibrous layer that varies in thickness from a few millimetres to several centimetres

The size and number of abscesses which may be present in any single liver differs.

[illegible] are generally d fferent ated (1) The *solitary* [illegible]

observed than the multiple variety Of [illegible] cases compiled by [illegible] 60 2 per cent were single abscesses and 39 8 were multiple The difference, however, between the two forms is not absolute, for several large abscesses may often be present, and some one of the multiple abscesses may attain a considerable size Moreover the solitary abscess may be of dysenteric origin and multiple abscesses may be idiopathic One particular abscess of the latter category is frequently distinguished by its size and other characteristics as older than the other, so that the more recent *abscesses must be regarded as metastases which have come into existence* from the older abscess by thromboses of branches of the portal vein Neighbouring absc [illegible]

The abscesses [illegible] by tapping 4 5 kg [illegible] case which yielded [illegible] an entire liver to [illegible] which are relaxed, resembling those of a cyst and leaving but little actual hepatic tissue to be recognised

The abscesses may be situated in any part of the liver, in the substance as well as on the surface They are however, found most frequently in the right lobe, and more especially in its posterior and upper part

[illegible] 453 of which (70 8 per cent) the right lobe in 85 [illegible] affected [illegible] ibly due [illegible]

Should the abscesses have their *seat on the surface of the liver they* may form prominences of various sizes [illegible] to the [illegible] perficial [illegible] ment or [illegible]

The termination of hepatic abscess varies Apart from being artificially [illegible]

opened, it may open spontaneously after adhesions have formed in several *directions* —through the skin, into the abdominal cavity, into the stomach, the duodenum, the colon the right renal pelvis, the pericardium, the hepatic veins, the right pleura, the right lung, the inferior vena cava The abscess bursts into the lung most frequently and into the pericardium most rarely

As to the frequency with which the rupture of the hepatic abscess takes place in various directions the following table, compiled by Rendu, and taken from Roux, gives particulars —

Authors	Number of Cases	Rupture into: Pericardium	Pleural Cavity	Lung	Abdominal Cavity	Colon	Stomach and Duodenum	Bile Ducts	V Cava	Kidney	Lumbar region
Waring	300	—	14	29	15	2	1	1	3	2	2
Dutroulau	66	—	2	10	—	1	1		—		4
Rouis	102	1	11	17	14	3	6	2		—	—
Haspel	25	—	4	2	2	—			—		
Cambay	10	—	—	2	1			1			—
	563	1	31	[illegible]	31	6	8	4	3	2	[illegible]
	Per cent	0·13	5 5	10 5	[illegible] 9	1	1 4	0 7	0 5	0 3	1

It sometimes happens that the abscess becomes encapsuled and the contents may become caseous or calcified The general opinion is that in excessively rare cases they *heal spontaneously* through the cavities contracting concentrically, their contents becoming absorbed the walls coalescing and leaving cicatrices with ray like processes Of course it is quite possible, that scars of this kind that have been found at autopsies and which have been pronounced to be healed abscesses may really be of syphilitic origin It must also be borne in mind that in cases of spontaneous cure it is not improbable that recovery has taken place by the pus escaping by way of the bile ducts (Roux)

In regard to the *remaining pathological changes* met with in hepatitis, peritonitis, pleurisy, pneumonia and pericarditis with their sequelæ, may be found without perforation having taken place contiguity having caused the inflammation to extend to the various organs in question The intestine frequently exhibits dysenteric changes The spleen is found to be sometimes small and sometimes enlarged owing probably to malarial complications Sometimes also abscesses are met with in other organs such as the lungs spleen, or kidney

SYMPTOMATOLOGY

Hepatitis often starts suddenly with an attack of shivering, or slight rigor In other cases the disease is preceded by a sensation indisposition for several days The rigor is followed by fever, whi however, is not high, and may even sometimes be entirely absent Th is almost always loss of appetite, eructation, nausea, and frequently vomiting. The stool is usually constipated, but in rare cases ther diarrhœa The patients moreover, usually complain of a *sensatio* *n the right hypochondrium* The pain is described

being deep seated, oppressive, or tense, and is most severe when the disease is superficially situated, whereas, if the abscess be deep seated it is relatively slight, or may even be entirely absent A *pain in the right shoulder*, occasionally shooting up to the side of the neck, or through to [illegible] resent It is [illegible] often feels as [illegible]

[illegible]

In one case of long standing Rouis observed that atrophy of the deltoid muscle occurred.

Deep respiration causes pain There is often some dyspnœa and a short, dry, painful *cough* in consequence of diaphragmatic pleurisy, or it may be due to the condition of the liver itself Finally, nearly all patients suffer from pronounced *insomnia*

In cases with a favourable course these symptoms may abate in two or three weeks, without the *formation* of an *abscess* Should the latter develop—which in acute cases occurs during the latter half of the second week, and in subacute cases after from two to four weeks—all symptoms as a rule are augmented The *fever* becomes more severe and exhibits an irregular, remittent, or intermittent type It sometimes resembles real intermittent fever, with a quotidian, tertian, or quartan type, occasionally it is of a typhoid type The temperature frequently exhibits the character of hectic fever, with attacks of shivering or rigor, alternating with profuse perspirations which frequently assume the form of night sweats The pains also frequently become more severe In some cases on the other hand, the pains decrease and whereas formerly they were distributed over the entire liver they now become more localised The patients in the meantime become emaciated and very weak

The *objective symptoms* exhibited by the sufferers are as follows At the first glance they give the impression of being very ill and have a peculiar pale yellowish, clay coloured *complexion* which, according to Sachs is something like that of a person with jaundice, and partly like the cachectic colouring of a person in an advanced stage of cancer, by Dutroulau the complexion is designated "*pâleur ictérique*" Actual icterus is not frequently observed The sclerotic is pale and has a peculiar faint glitter which Sachs compares in colour and gloss to that of white wax

The patients usually assume the *dorsal position*, but slightly inclined to the right, the legs are somewhat flexed and the head bent forward This position is one in which pressure on the diseased organ is lessened as much as possible

The *tongue* is covered with a thick yellowish white moist coating

Respiration is usually accelerated and exhibits mostly the costal type

The *liver* is without exception *enlarged*, this is often perceptible on inspection alone and is confirmed by palpation and percussion The enlargement is either universal or affects only the right lobe Sometimes [illegible]

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slight œdema is sometimes perceptible over the lower ribs According to Hassler and Boisson a feeling of deep springiness and elastic tension resembling what is felt on palpating a thick walled tensely distended india rubber balloon is pathognomic of large abscesses

Percussion proves that the enlargement of the liver takes place first upwards and only subsequently downwards According to Sachs, this is because the diaphragm offers less resistance to the swollen organ than the other structures in the neighbourhood this is the case in other acute enlargements of the liver and also of the spleen The line of dulness as a rule appears slightly convex above and the mobility of the pneumo-hepatic border varies but little during respiration The liver also does not alter its position when the patient is turned on the left side, owing to adhesions of the liver to the abdominal wall (Pel) Sometimes the signs and symptoms consist of a compression of the lung with dulness at the right base and of weakened or bronchial respiration such as is met with in pleuritic exudations

Occasionally *pleuritic* and in superficial abscesses also *peritonitic friction* may be heard

Hassler and Boisson perceived a *friction* a *fine crepitation* over the hepatic region, especially on inspiration they were, however able to prove at the autopsy that it had not proceeded from perihepatitis According to their view the sound was caused by the œdematous hepatic tissue over the abscess being pressed against the diaphragm during breathing

The *abdominal muscles* more especially those of the right side, are frequently found to be rigid on palpation This however, is not a pathognomic symptom as it was formerly considered to be as the same condition is also observed in other painful abdominal ailments.

In rare cases there is distension of the superficial veins of the abdomen, in consequence of the pressure against the abdominal wall exercised by the enlarged liver there are moreover hæmorrhoids, ascites and œdema of the lower extremities attributable to compression of the portal vein or the inferior vena cava

The *urine* is usually diminished in quantity at first it is concentrated and contains uric acid and urates in excess When the liver is much diseased, Cayley observes that the secretion of urea is much diminished and the urine pale, watery and of a low specific gravity

Sooner or later the patients die of general exhaustion if no surgical operation is undertaken In other cases as we have already seen there is *spontaneous rupture* of the abscess outwardly or inwardly into neighbouring organs If the abscess breaks through into the abdomin cavity, the pericardium the hepatic vein or the vena cava, deat rapidly occurs, whereas if the perforation takes place in other directio the disease sometimes has a favourable issue

The rupture is sometimes preceded by symptoms that lead one t conjecture what is to follow Thus perforation into the stomach duodenum is signalised by obstinate vomiting and convulsive pains in t epigastrium, perforation into the colon by colic and tenesmus, resembl the pains in dysentery rupture into the lung by the symptoms pleuro pneumonia Swelling and redness at the place on the skin wh the rupture will take place outwardly is often observed Frequen however, the rupture takes place quite unexpectedly Then mas pus more or less stained reddish or reddish brown by being mixed blood may be coughed up vomited or passed with the stool or u These masses of pus also contain fragments of tissue of all kinds (b

cells, shreds of cellular tissue, hepatised pulmonary substance, and muscular fibres from the diaphragm) and are occasionally voided in the form of little lumps varying in size from a hemp seed to a pea Should these be discharged into the duodenum, it is usually so intimately mixed with the contents of the intestine, that they entirely escape observation Sometimes large blood vessels or biliary ducts in the wall of the abscess are opened, so that considerable quantities of blood or bile are discharged outwardly The fistula which is thus set up may heal, or it may remain permanently

The rupture of a hepatic abscess into the abdominal cavity causes peritonitis, which in a few hours or days ends fatally

Should perforation take place into the *pericardium*, violent pains, dyspnœa, and the physical symptoms of rapid pericardial effusion set in, a fatal issue quickly follows

The signs and symptoms of liver abscess are not always so characteristic as here described In more chronic cases, in which the abscesses develop slowly and insidiously, the symptoms may be very obscure The fever and rigors may be absent pain over the liver may not be pronounced and the enlargement of the organ is inconsiderable The appetite is usually diminished and the digestion disordered, the stools are irregular and sometimes loose The patients feel unwell and become thin and weak Sometimes œdema of the feet sets in There may be a cough, with some mucous ... lmonary disease is the first ... friction fremitus and slight ... Other cases may be mistak ... nly *post mortem* that the real nature of the disease is recognised Encapsuled abscesses may run an entirely latent course and are recognised at the *post mortem* examination

The more acute forms are particularly observed in young and strong *persons who have not been long in the tropics, whereas the chronic forms* occur usually in older residents weakened by the climate

The *duration* of hepatitis is very variable In favourable cases without suppuration a cure may be expected in a week or two In purulent hepatitis also, if the abscess be diagnosed and operated on early, recovery may ensue in two or three weeks *Generally, however, the disease drags*

the statistics sometimes only refer to those cases of hepatitis ending *in* abscess, and sometimes include those without suppuration

The plan of treatment adopted also exercises a considerable influence on the mortality, and the rate of mortality may be different also in

d 34 per cent, in these statistics the non suppurative cases are included and, as Morehead observes cases of cirrhosis may also have crept in Fayrer's reports as to the frequency of hepatitis amongst the English soldiers in the various foreign stations give a still lower percentage Between 1870 and 1872, 9,615 cases were observed and of these 461 *i e*, 4 8 per cent, terminated fatally From 1888 to 1891 the number of cases of disease was 4,882, the number of

deaths 829 the mortality therefore being 6 7 per cent In the Dutch Indian army the mortality according to Daubler, fluctuated between 15 3 and 19 per cent within eight years

MacLeod wishes to differentiate suppurative and non suppurative hepatic inflamma [illegible]

Death mostly ensues from exhaustion in rare cases it is the result of peritonitis, pneumonia or other diseases

As to the *frequency of the various causes of death* the following statement of Rouis will serve as illustrations In his 162 cases with a fatal issue, the cause of death was as follows —

[illegible]

DIAGNOSIS

The diagnosis of hepatitis is not difficult in typical cases [illegible]

history of disease Pneumonia at the base of the right lung is also always suspicious in a tropical patient

The *earliest possible discovery of the presence of pus* is of great importance as regards treatment The commencement of abscess formation is by no means always signalised by rigors Sometimes it is merely indicated by t[illegible] the entire live[illegible] pain obtains [illegible] region mu[illegible] tion freque[illegible] ayed through vomiting being constantly induced when pressure is made on

[illegible]

even in cases where no pus is found, the consequent bleeding often affords the patient great relief so that this measure is also recommended for therapeutical purposes

Exploratory punctures are carried out by means of a Pravaz s syringe with a hollow needle 10—15 cm in length and not too thin or by means of an exploratory trocar and aspirator When there is no symptom indicating the seat of the abscess the puncture is made in the axillary line, in the eighth or ninth intercostal space about 2½ to 4 cm distance from the costal margin and beneath *the border of the pleura the needle* being directed up and towards the back these directions are followed because most abscesses are situated in the upper and posterior parts of the right lobe of the liver

If no pus is obtained at the first place examined the puncture should *be repeated at other spots Manson recommends that at least six punc*tures be made before ceasing the search for pus

Hassler and Bo sson and Powell recommend exploratory laparotomy (at the external border of the r ght rectus abdom nis muscle) as be ng less dangerous than exploratory punctures

The following diseases may be instanced amongst others as liable

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ible from its superficial position and more particularly through *Middeldorff's method of investigating tumours* (Sachs) Should a long entomological needle or an exploratory trocar be introduced into an abscess of the abdominal wall the needle will remain immovable and uninfluenced by respiratory movements If however a liver abscess is punctured the needle will swing like a pendulum with the respiratory movements its projecting end swinging upwards during inspiration and downwards during expirat on

(5) *Suppurative hydatid cyst* —A suppurative echinococcus cyst is capable of causing symptoms s milar to those of a liver abscess The differential diagnosis is principally fixed by the history and by the demonstrat on of hooklets in the pus removed by exploratory puncture

(6) *Agglomerat on of pus in the gall bladder* —This may be easily recognised by the situation and form (pear shaped) of the painful fluctuating swell ng

(7) *Pylephlebitis* —The absence of hepat c enlargement (if consecutive formation of abscesse

of the portal vein

patic diseases such as

malignant tumours, softened syphilomata, hydatids, dilatation of the gall bladder, all of which are distinguished by a slow and afebrile course

PROGNOSIS.

The prognosis is a serious one in every case of hepatitis It is unfavourable when the patients have been weakened by over exertion, alcoholic excess, previous or contemporaneous diseases, more especially dysentery and malaria

it *breaks inwardly*, the rupture into the lung is the most favourable after that into the large intestine Perforation into the pericardium or abdominal cavity is fatal

PROPHYLAXIS.

The principal prophylactic requirements are the thorough treatment of chronic dysentery leading a regular life and being especially abstemious in the use of spirituous liquors

TREATMENT.

At the commencement of the disease the treatment is *antiphlogistic* Ten to fifteen leeches should be placed on the hepatic region or on the anus (but not if dysentery is present Roux) and this process is repeated if necessary after a few days General blood letting, such as was customary formerly is not now practised It is only exceptionally, and mainly in the case of strong young people when difficulty in breathing is caused by the pressure of the liver on the lung that moderate phlebotomy is indicated An *ice bag* not too heavy should be laid over

cleaning the teeth and rinsing the mouth out with chlorate of potash Attention must be paid to get the bowels well opened, but without inducing diarrhœa, besides calomel saline aperients will be found to be particularly suitable—Carlsbad salts Friedrichshall water or Hunyadi-Janos mineral water

Chloride of ammonium is frequently administered, especially by English medical men 1 2 morning and evening Stuart who was the first to recommend the drug declares that it even causes absorption of abscesses. Roux and Manson, on the other hand found it ineffective

According to Dabney, nitro hydrochloric acid baths are valuable remedies in all forms of acute and subacute inflammation of the liver, 30·0 of nitro-hydrochloric acid

are added to from 4½ to 9 litres of warm water Both feet are placed in the liquid, and the lower extremities and hepatic region sponged with it The bath should last *fifteen minutes, and if found too strong the acid must be more diluted*

Narcotics may have to be used to allay *violent pains* and to induce *sleep*

Should the fever cease and the *inflammation decrease without abscess* formation, *damp warm compresses* on the hepatic region and *warm baths*, should take the place of the antiphlogistic regimen

As soon as exploratory puncture has revealed the fact that *pus* has *collected* in the liver it must be *removed* For this purpose several methods may be used

(1) *Puncture drainage* —At the place where exploratory puncture has yielded pus, a thick trocar such as is used for abdominal puncture is inserted, after an incision 2—4 cm in length has been made through the skin and the superficial tissues, in order to avoid the possibility of blood or biliary vessels bursting, or the loosening of adhesions, the pus is allowed to flow out slowly, a suitable drainage tube or a Nelaton's ... od Or ... ealing ... nd the ... m and a sufficiently large drainage tube inserted in its place, the wound, if necessary, having been previously enlarged with the knife or dilatation forceps After puncture the abscess cavity is washed out with a warm weak disinfectant solution (1 per cent carbolic acid, 0·1 per cent salicylic acid, ½ per cent lysol, &c), this, however, should only be repeated when decomposition of the pus sets in An antiseptic dressing is then applied, which at first is changed twice daily, then once a day, and later more seldom still Corresponding with the reduction of the abscess cavity the ... can at last be dispensed with, as is ... simplicity, is suitable for private prac ... r weak and anæmic patients, as also for cases in which the suppuration is deep seated

Should the flow of pus be insufficient a counter aperture must be made in as deep a place as possible In case the puncture has been made between two ribs the excision of part of a rib may be necessary for the same reason

Fayrer has introduced a particular trocar provided with a groove which serves for the introduction of a narrow *knife or dilatation forceps for the purpose of dilating* the puncture wound.

(2) *The broad stratified incision* —In abscesses that can be reached from the abdomen below the costal margin the abdominal walls are *divided in layers in a direction parallel to the ribs* The liver, when exposed, is fixed to the walls of the wound by a few stitches, or, if this is ... nal wound are pressed lightly against ... nd are packed with iodoform gauze ...

In abscesses that cannot be reached from below the ribs the opera

t on must be conducted by way of the thorax commenc ng wi h the subperiostal exc s on of one or t vo ribs at the spot where the exploratory puncture has foun l pus If not adherent the pleural cav ty s then opened In order to prevent tl e introduct on of a r the two surfaces are sewn together or odoform pledgets are firmly pressed to the upper margin of the wall The d aphragm is then d vided and the abscess nc sed

Th s method is preferable to that of puncture drainage but t is more d fficult and compl cated and therefore less su table for pr vate pract ce

Should the sk n over the abscess be already nflamed tl e presence of adhes ons may be accepted as a certa nty and the inc s on can be made at once

Zancaro to whom a great quant y f mater al was ava able (he observed 562 cases

When *fst la* rema n Rou s recommends the use of sulphur baths

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IV.

SLEEPING SICKNESS OF THE [illegible]GROES

DEFINITION.

SLEEPING sickness is the designation of a d
African negroes, it consists of a peculiar somno
always, sooner or later, terminates in death

SYNONYMS

GEOGRAPHICAL

The geographical region of dis
limited one, extending over the
Angola and the hinterland apper
less, does not occur uniformly
villages, while neighbouring pla
very frequent in the cataract r
hand, it is unknown at Stanley
and at Banana Point on the ne
(Manson) The disease also s
appears epidemically Occas
that in the Congo District neg
to small pox

Besides West Africa, sle
French Antilles, the Baham
have been brought from West

[illegible], not only
ther hand,
ls', 60 per
he disease
ping sick

SYMPTOMATOLOGY.

The appearance of the somnolent condition is preceded, often for a long time, by *prodromal signs*, which are so characteristic, that the

for this purpose he seeks out lonely quiet spots, where he spends a long time in dozing In reference to this, however, it must be remarked that the healthy negro also sleeps a great deal

Junker v Langegg says 'The negro works—when forced to—but with frequent

The *inclination to somnolence* can at the earliest stages of the disease, be resisted to a certain degree and if loudly addressed the patient will give correct if only monosyllabic replies If aroused, however, he always

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confined to one s ... is also observed

Sensibility is usually ... or if at all, it is only somewhat decreased during the last period o... disease sometimes isolated anæsthetic patches are found on the trunk or limbs The superficial reflexes are as a rule normal The knee jerks are present, and rather strengthened than weakened (Mackenzie, Manson)

Cagigal and Lepierre, in one case, found that sensibility was diminishe and the reflexes weakened, part of them indeed arrested, the electr excitability of the whole body was diminished

No disorders can be demonstrated in the internal organs The urin is normal, the stool alternately loose and *constipated*, when *somnolenc*

rvical glands are *enlarged*
raclavicular glands Thes
e onset of the disease, are
however, rarely very pronounced, in the multiplicity of cases they never according to Corre, exceed the size of a bean They are not generally sensitive Occasionally, there is enlargement of most of the superficia lymphatic glands

Sometimes the salivary glands, the parotids and the submaxillary, are swollen and there is increased salivation

The patients frequently suffer from severe *pruritis*, especially on the trunk, a papular, vesicular, pustular, or impetiginous *exanthem* may appear on the breast and abdomen

According to Mense this is caused by the defective care of the skin by the patients, whose cutaneous sensibility decreases more and more

The alimentary functions, appetite, digestion, nutrition, &c, remain unchanged for a long time In the last stage of the disease, however the patient gets thin, and becomes very weak, the pulse becomes small and thin, the skin dry, rough and exfoliatory, slight œdema is occasionally seen at the articulations or the face becomes puffy, bed sores develop the somnolence gradually increases to a deep stupor, and death quietly ensues Sometimes death takes place in an attack of convulsions Some times, according to Forbes, the somnolence disappears towards the end and consciousness returns Occasionally death ensues from intercurrent

vements take place, the *fatal*
that, of 148 cases, all except
, 132 out of 179 negroes who
erra Leone coast within eleven
rbes observed thirteen cases, of
which eleven had a fatal termination The result of the other two cases was unknown to him

The *duration of the disease* is usually between three and twelve months the average duration being nine months, it may, however, drag on for two or even three years The care accorded to the patient exercises a decided influence on the time

PATHOLOGICAL ANATOMY.

Up to the present very little pathological material has been available, as the earlier *post mortems* were not conducted with the necessary care and minuteness, and they only yielded uncertain and uncharacteristic evidence

According to the most recent examinations by Mott, two of whose cases died and were examined in Charing Cross Hospital, London, it appears that in sleeping sickness it is the question of a *meningo encephalitis* Marchoux also found this condition in one case

The microscopical changes in Mott s two cases were very slight The *pia mater* was thickened and opaque, the cerebral substance was hyperæmic, and in one case the

inflammatory changes

ETIOLOGY.

The cause of the disease up to the present time is still obscure The various hypotheses as to its genesis that have been set up have one and all proved untenable The following are some of the theories brought forward a process of intoxication (poisoning by a certain fungus adhering to maize, rice and other cereals, analogous to ergotism, poisoning by palm wine, Indian hemp poison given for criminal purposes) The theory that the disease may originate from emotional distress intimately connected with negro slavery (home sickness distress of the individual caused by his separation from his family, ill treatment by the slave dealer and planter, &c), or in consequence of sunstroke The disease is also attributed to scrofula (on account of the glandular swelling in the neck which exercises pressure on the vessels leading to the brain, and thus are able to cause cerebral anæmia), to malaria or to beri beri.

The disease has nothing to do with the above named conditions, nor has it anything to do with so-called nona, which aroused attention some few years ago and which probably is a question of malaria

Recently microbes have been found in sleeping sickness by several authors, and have been pronounced to be the cause of the disease.

[illegible] discovered by them as the cause of the disease Brault and Lapin, who had a

The hypotheses which connects *animal parasites* with sleeping sickness are founded on equally slender bases

Manson
may be in
sickness
known, cer
perstans in five out of nine cases of sleeping sickness (blood slides of which were sent to him from Africa) and also in the two cases observed in London When

of sleeping sickness

the cerebral vessels

Ferguson attributes the disease to *anchylostomiasis* As however, the occurrence of sleeping sickness in the indigenous Indians of British Guiana has not yet been confirmed, it is questionable if the cases observed by him were really sleeping sickness.

Sleeping sickness is a *disease of the negro race* With one or two exceptions—Chassaniol observed it in a mulatto, Clarke in a negro creole boy—it has hitherto only been positively seen in pure negroes, never in other coloured people, nor in Europeans As already mentioned, the disease occurs amongst negroes outside their native land, as in the Antilles, &c, but it has never been observed in persons born in Europe, nor in those living there for decades (Guérin) It is, however, seen two, three, or even seven years after negroes have left their native land

Sleeping sickness occurs equally in both *sexes*

No *age* is spared but persons between 10 and 20 years of age are most frequently attacked

Occupation exercises no influence

According to Clarke, the development of the disease is favoured by
Low spirited
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leeping

sickness is particularly frequent in young girls who have not yet men

transmission also seems to Corre not to be excluded

DIAGNOSIS

The diagnosis of sleeping sickness is easy Confusion with other diseases is scarcely possible

PROGNOSIS

The prognosis has already been sufficiently indicated

TREATMENT

Treatment is almost powerless Attention is chiefly directed to the *feeding of the patients* If necessary this must be done *per rectum* Dried peptones (15 0 100 0 several times daily) is particularly suitable for nutritive enemata

At the commencement of the disease aperients are recommended Moreover, quinine arsenic strychnine (subcutaneously) iodide and bromide of potassium santonin (Cauvin) stimulants inhalations of oxygen (Rey) blisters over the cranium moxa on the neck cold spongings,

Forbes states that good *results* are attained by *electricity* applied over the spine This is supposed to stimulate the nervous system

Various observers recommend treatment with thyroid extract on account of the resemblance of sleeping sickness to myxœdema

According to Manson, several cases have been cured by injections of *scrotal juice*

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V

RUNNING AMOK OF THE MALAYS.

ongst the Malays The
populous streets of the
pon—a cris—carried by

wounded or killed

Amok is a Malay word and signifies a frenzied impulse to murder The person thus affected is called *Orang amok* (i e amok man) and the active verb is *Meng amok* (i e, to make amok to run amok)

The term amok is often used in an erroneous sense it being often applied to other conditions more particularly the outbreaks of fury occurring during inebriation

Running amok is peculiar to the Malay race, and occurs solely in the Malay Archipelago and on the Malay Peninsula It is most frequently observed amongst the Buginese, the natives of Celebes. According to

to the official Colonial reports of 1893, cases of amok occured mostly in the provinces of Rembang and Madura.

According to Van Brero Blandford observed similar cases of murderous attacks in Trinidad in imported coolies. It is ascribed there to the use of *Indian hemp* and when the culture and importation of the poison was prohibited such crimes became considerably fewer

Swaving (according to Van Brero) mentions that running amok is especially observed in farmers and mountaineers It is *never* or *very rarely seen in women* In former times it was more frequent than it now is, and Van Brero directs attention to the fact that it has never appeared endemically or epidemically

avoid communication with their fellow men, sit down and probably brood over something Ellis states that the Malays, on the whole, have a tendency to a peculiar frame of mind, in which they brood over real or

This
ts for a
Ellis,
gapore

see beasts or devils which they stab down, and then know nothing more Later on they are apt to say that they have been "*mata glap*" (*i e*, my eye has become dark), which is as much as to say "I did not know what I was doing"

During the period of the attack there is *complete amnesia* The attack as a rule, only lasts a few hours, sometimes, however, the period of excitement drags on for some few days

After the attack the patient relapses into a *stupefied condition*, which occasionally deepens into a *deep stuporous sleep* which may last for days, in this condition the patient is morose, forbidding and taciturn The short answers wrung from him are, however, correct and connected According to Ellis they, in addition, exhibit a savage, unearthly, surprised expression of countenance, the activity of the heart and the respiration are accelerated The same author states that months after, if much questioned as to their attack, they have a tendency to relapse into the same stuporous condition

The following *incidental causes* of amok are given Strong emotion such as is occasioned by the faithlessness of a wife, sorrow occasionally caused by the death of a near relation, grief on account of an actual or
ds and chattels through gambling,
r of disgrace, as for instance to be
mprisoned, terror, the sight of
and some feverish conditions,
especially malarial fever

Owing to our imperfect knowledge of running amok it is impossible to express a decided opinion as to its etiology and its place in the classification of insanity it is, however, possible to discard a few of the earlier opinions as erroneous

It has been sought to establish some connection between *Mohammedanism*, to which creed most Malays belong, and running amok on the grounds that the murder of an unbeliever is by the Mohammedans looked upon as a deed pleasing to God In the Koran, however, no sentence can be found to justify this assertion, and, above all, the amok runner turns his weapon against the faithful and unfaithful alike In addition, amok running is supposed to have occurred previous to the conversion of the Malays to Mohammedanism (Ellis)

Amok running has been regarded as a form of *suicide*

Wallace says "By the natives of Celebes suicide is regarded as a national and therefore an honourable proceeding, and it is considered the proper way to release oneself from a difficult position A Roman falls on his sword, a Japanese splits open his abdomen, an Englishman blows his brains out with a pistol, while the Buginese runs amok" This opinion, however, is as a rule decidedly contradicted by the symptoms observed in amok runners before and after the catastrophe

It may of course occasionally occur that amok is simulated, some one, for certain reasons, may be tired of life and wish to die, and therefore runs amok, whilst quite sane, in the hope of being killed, for according to the ethics of Mohammedanism suicide is a great sin, and is seldom observed amongst the Malays (Ellis)

Heymann held the opinion that running amok was attributable to the *immoderate use of opium* All modern authors, however, coincide in refuting this idea, and at present the conclusion has been arrived at that the use of opium has by no means the injurious effect on the human body formerly ascribed to it

Running amok can also not be said to be due to acute *alcoholic insanity*, for Malays are not addicted to the abuse of liquor, and Indian hemp also, is not much partaken of by them

Ellis, following the opinion of Bevan Lewis, according to whom every impulsive mental disturbance with pronounced cloudiness of memory is due either to epilepsy or alcoholic delirium, is inclined to regard running amok as a *psychical epilepsy* although according to his observations ordinary epilepsy occurs relatively rarely in Malays Van Brero, also, in his practice, did not observe very many epileptics, but on account of the remarkably numerous cicatrices of burns and other wounds which are seen in Malays, deems it possible that there is a greater frequency of this disease than is generally supposed In order to decide the question of the correctness of Ellis's views, the demonstration of other epileptic symptoms of disease in amok runners would be necessary, and whether one person had had repeated attacks of amok, this has not yet been ascertained.

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Rasch considers running amok to be a transitory *mania*, which, according to Krapelin, is highly probable on the basis of the epileptic theory

Finally, according to Van Brero, running amok may have *various origins* It is either a *symptom of insanity* (and according to Van Brero it may occur in any mental disorder, particularly in epilepsy, periodi

control of the passions and desires due to the defective training and education of the Malays, who as a race are abnormally excitable

We see much the same temperament in children when punished It is a fact also that Malays attach no value to the lives of their fellow creatures, owing, no doubt, to the example set them for ages by their own princes Malays always carry weapons, so that their use in mental disturbances is but second nature

The scarcity of running amok amongst women is, according to Van Brero, explained by *the fact that in females emotion is indeed quicker,* but is not so strong and that above all, in consequence of their less heed of annoyances and offences which they are submitted.

The question as to the *responsibility* of the person that runs amok is of great importance One can only agree with Van Brero in asking that responsibility must not be generally affirmed, but that every single case must be regarded separately For this reason it is requisite that an examination of the patient be made immediately after the attack Besides the cases in which there is mental oblivion, there may be cases in which responsibility is present or only diminished. Even Ellis allows that sometimes the amok runner, because he wishes to die voluntarily, gives free rein to his passions though he is quite capable of bridling

purposely and then commits a crime in blind drunkenness must be completely conscious as to what probably will be the consequence of his first intentional act

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of its occurrence from other countries which geographically and ethno

according to Hogstrom similar symptoms are found

I on brandy the nat onal drink of the Japanese
Egg plants (solanum melongea) the fruit of whi h is eaten

The disease occurs chiefly in *women* and *childr n* especially in weak minded superstitious persons It is frequently observed during convalescence from such

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GIMLETTE J

with a

GUINON G

HAMMOND W

its Ana

O BRIEN J

1883 June

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V.—CUTANEOUS AND LOCAL DISEASES.

I

PRICKLY HEAT.

SYNONYMS

Lichen tropicus, Eczema tropicum, Miliaria papulosa, Der rothe Hund, [illegible], Eczéma tropical, Miliaire rouge, [illegible], Boutons de chaleur, Gale bédouine (Algiers), [illegible] Hond, [illegible], Nil itch (Egypt), Ghamach (Bengal)

Prickly heat is an ailment with which almost every visitor to the Tropics becomes acquainted on his own person. It is an *acute form of eczema* attributable to increased and permanent secretion of perspiration induced by excessive heat. It is by no means peculiar to the Tropics alone but also occurs in higher latitudes during the summer. *Eczema aestivum*, which in Europe is observed particularly among children, is nothing more nor less than a slighter degree of this complaint.

The eruption in prickly heat breaks out remarkably quickly. The parts of the skin affected, when superficially observed, look like red patches, but when more minutely examined they are found to consist of innumerable closely set, diminutive, red papules. Upon these small vesicles develop, which usually burst, so that larger or small areas appear quite raw [illegible]

The complaint may spread over a small or larger portion of the surface of the body. The parts most severely affected are the trunk, particularly the back and shoulders, the forehead, next the arms and backs of the hands, and most rarely the legs and face.

The eruption is accompanied by severe *irritation* of a *pricking* and [illegible] The [illegible] night [illegible] [illegible] and a serious ailment in the case of sick persons, delicate little children and travellers.

In severe cases *pustules*, *boils* and other forms of *dermatitis* may develop, partly in consequence of the scratching and partly through septic matter being introduced through the cutaneous erosions, or inoculated by the finger nails.

A particular *pustular* form of the disease is therefore distinguished. It occurs principally in the axillary cavities, round the waist and on the inner surface of

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fatal issue from diarrhœa and fever

The *duration* of the disease varies In mild cases it disappears in a few days Often, however in consequence of repeated relapses it drags on for weeks and months When cooler weather sets in recovery usually ensues

The *cause* of prickly heat is found to be the inflammation set up in the skin by the immoderate amount of sweat secreted and left in contact with the skin and which in addition is loaded with excreted matter (common salt urea &c) the consequence of the diminished excretion of urine

Europeans are principally affected by the complaint Personal pre *disposition however varies and generally depends on the intensity of* the sweat production Prickly heat by predilection attacks stout and gouty persons and those who eat largely of nitrogenous foods In some people the disease returns every year during the hot season As a rule how ever it becomes milder every year till after a few years it does not appear at all the skin appearing to accommodate itself to the effects of heat Natives are not immune from the disease but in them the con dition is rare Half castes are more liable to be attacked than natives According to F Plehn the negro race is possessed of complete immunity

TREATMENT.

The first necessity of treatment a treatment also necessary for *prophylaxis* is *to limit the secretion of sweat as much as possible* This is accomplished by wearing light porous loose clothing The illness is favoured and augmented by wearing woollen undergarments[1] Bodily exertion should be avoided and as little liquid as possible should be imbibed Only cold drinks and small quantities of these at a time should be taken

[1] For wear in the tropics smooth fine cotton singlets are most suitable Aertex cellular clothing of which the meshes are not too large is also highly recommended For the outer garment cotton materials are also the best

[illegible] the second [illegible]

use of soap for baths

After bathing it is advisable to *powder* the skin with starch, talc, lycopodium or the like, and this should be repeated at bed time. Manson for this purpose uses a powder consisting of equal parts of boric acid, starch and oxide of zinc.

Fisch advises that after the bath the skin should be *anointed* with borlanolin. Graf's byrolin in tubes is particularly adapted for this purpose.

[illegible] 1 : 1,000 but [illegible] phate of copper ([illegible] per cent.), chromic acid ([illegible] to [illegible] per cent.), borax after the bath [illegible]

[illegible] should be opened with a needle or [illegible] c acid water and then powdered [illegible]

[illegible] tients should be advised to take a [illegible]

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The disease is ushered in by the formation of multiple ulcers varying
of from 1 to
the leg and
ers develop
sometimes
but not always a vesicle is seen The nodules cause unbearable irritation and are probably ruptured soon after their development by scratching First small flat ulcerations form which under the continued influence of the mechanical injury increase in depth and circumference but they rarely attain a greater depth than 2½ to 3 mm They are almost always circular in form more rarely the confluence of two ulcerated edges causes the shape to be irregular

The spread is undoubtedly due to auto infection by means of the specific cause of the disease deposited under the finger nails Whereas in mild cases the process may be confined to the legs and the interval between the single ulcers considerable averaging between 6 to 12 cm in severe cases the entire lower limbs to the soles of the feet and also the gluteal region and the nates are affected and the distance between the ulcers averages only a few centimetres The ulcers are covered by dark eschars which are formed by the coagulation of the blood started by scratching After their removal discoloured granulations that exude a thin pus are exhibited

In such cases the condition of the patients is deplorable in the extreme The disease usually runs its course attended by intercurrent increases of temperature Even the epidermis between the ulcers which is not disintegrated becomes eczematous and furuncular through the irritation exercised by the secretion from the ulcers and from the effects of scratching

A large uneven infiltration beset with ulcers mostly forms in the vicinity of the nates so that only a few healthy places can be observed on the diseased parts

In this condition every position is unbearable to the patient Defæcation is painful and difficult in consequence of the ulcers on the anus to sit down causes discomfort rest at night is well nigh impossible

The disease is doubtless of an *infectious* nature F Plehn found bacteria of various kinds in the secretion of the ulcers and in the granulations staphylococcus pyogenes aureus and two fine species of bacilli were always present experimental transmissions on negroes however always proved negative

The prognosis even in severe cases is favourable but rapid recovery must not be expected Dark pigmented spots which sometimes remain for years are left on the seats of former ulcers

F Plehn s treatment consisted in causing the patient to lie on an air
c h 1
b
re
c
powdered with oxide of zinc the inflamed edges anointed with boric vaseline and a tight bandage applied At the same time a nourishing diet is indicated along with iron or arsenic

E P h

Emily finally has described an affection as craw craw that is doubtless identical with endemic *Oriental boil* (see chapter on Oriental sore)

In view of the various applications of the des gnat on craw cra v it appears desirable that the word should be ent rely dropped and the separate affections thus termed and which present particular asp cts of disease verifie l by scientific names as F Plehn in some cases l as already done

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III

TINEA IMBRICATA

DEFINITION

Manson designates as tinea imbricata[1], a skin disease that principally occurs in the Malay Archipelago and in the South Sea Islands It is related to herpes tonsurans but is caused by a special fungus quite different from trichophyton tonsurans

SYNONYMS

s (R tter) *Dermatomycos s c] roi ca*
fig amson) *Herpès de Manson* (Roux)
Daj (Dajak) *Gui e i e* skin (G lbert
Isla Island) *Tokelau ringworm* *Lafa*
Toke au (Samoa) *Gogo* (Marsha l Is ands)

GEOGRAPHICAL DISTRIBUTION

The *geographical region of distribution* of tinea imbricata extends over the Malay Archipelago and the South Sea Islands from Sumatra to the Marquesas and Sandwich Islands

Which of these islands may be regarded as the actual native land of the disease is not known We are only aware that during the last few decades the disease has spread from one group of islands to the other in a south easterly direction Thus in 1860 the disease was taken from Tamana Island belonging to the Gilbert Group to the Tokelau Group especially Bowditch Island and it was here called *Pita* after the immigrant named Peter who brought the disease to the island From the Tokelau Group the disease was carried to the Samoa Islands where it

ad to

ments

—I saw several cases in the Pauper Hospital of Singapore—Burmah and Chittagong In China (Amoy) also Manson observed the disease but almost solely in persons who had immigrated from the Straits or Malaya

In some places the disease is so widespread that the greater part of the population is affected by it

ETIOLOGY

Tinea imbricata is due to a particular *fungus* which nestles in the epidermal layers especially the rete malpighii, whereas the cutis remains

[1] From *imbre r* a t le

(5) In herpes tonsurans the sc e easily re ognised when the scales cou as numerous as in tinea imbricata solut on of liquor potassæ, as con in
(6) In tinea imbricata usuall which both partly contain a dark re ldish herpes tonsurans however, the m t resemblance to *tryclophyt n tons rans*
(7) Inoculation with the sca flers therefrom inasmuch as it is present

ph ton (from λεπ s scale and φυτον a plant)

A warm moist even climate such as obtains in the above mentioned countries seems to be necessary for the development of the fungus During the cool season a remission of the disease usually occurs

The disease is *infectious* The transmission takes place either d rect from man to man or ind rect by means of clothes mats &c

Manson has repeatedly succeeded in experimentally transmitting the disease to the healthy The first symptoms set in about nine days after the inoculat on

Natives as well as Europeans may be attacked by the ailm nt Neither age nor sex has a predisposing influence

SYMPTOMATOLOGY

In tinea imbricata the skin is more or less extensively covered by peculiar scales resembling tissue paper sometimes ind ed the entire surface of the body is affected

Symptoms of inflammation such as redness injection &c are not usually present nor have they been exhibited previously From the very commencement the d sease which takes its point of departure from one

more minutely circular areas will be seen just as if the disease had started from d fferent centres in parallel and concentric lines The circles are generally situated ¼ to ½ inch apart At places where one system of concentric lines touches another the symmetry is disturbed so that it is barely or not at all recognisable The scales are so arranged that their free ends are towards the centre of the circle or system of circles to which they belong When the hand is passed over the d seased part in the d rection from the periphery to the centre the scales are stroked down smooth if on the contrary the hand is passed over in the reverse d rec

[1] 1 inch = 2·54 cm.

'piebald" appearance, owing to the, its
exhibited ions.
After recovery the skin remains
mented
As Manson s experimental inocu ATA ences

so on
There is no part of the body that may not become the seat of the disease Certain places however, are only apt to be attacked after parts are the hairy parts of the feet, the flexors of the lar the groin and scrotal folds, popliteal spaces, and the genitals The hair and nails never participate the disease, but Manson in contradiction to other authors states that in herpes tonsurans, the hair and nails are frequently affected
Itching is the chief inconvenience caused by the disease but th

slightly by itching
The affection is a *very chronic* one, its duration unlimited taneous recovery never occurs

DIAGNOSIS

The diagnosis of tinea imbricata is not difficult The only disea which it might be mistaken, or with which it could be confused is he tonsurans According to Manson the following differences stamp the diseases —

(1) Herpes tonsurans, in contradistinction to tinea imbricata, seld if ever affects the whole surface of the body, or even an entire limb

(2) Herpes tonsurans, by predilection, attacks the hairy parts of th

(4) In tinea imbricata one ring always forms within another, in herpes tonsurans, on the other hand this is only rarely the case, usually while the ring is enlarging towards the periphery healing is taking place in the centre.

(5) In herpes tonsurans the scales do not attain the size, nor are they [illegible] in [illegible] nea

tinea imbricata and never herpes tonsurans and *vice versa*

(8) Herpes tonsurans occurs in all climates whereas the geographical region of distribution of tinea imbricata is very limited

Confusion of tinea imbricata with pityriasis versicolor, psoriasis ichthyosis and syphilides, is easily avoided

PROPHYLAXIS

Daily ablutions of the body, with a plentiful supply of soap, afford the best protection

TREATMENT

The treatment consists in the local application of *epiphyticide drugs*, of which *tincture of iodine* and *chrysarobin* (1 10—15 vaseline or lanoline, or 1 10 traumaticin, the latter especially when the disease is situated in the face) have proved most efficacious Tincture of iodine is used when the disease is not extensive and chrysarobin when it is widespread and when the skin is tender (children Europeans) The application should be preceded by a hot bath with a thorough lather with soft soap and rubbing down with pumice stone

Manson found that *iodine liniment* which he prescribes[1] twice as strong as that of the British Pharmacopœia had the most decisive results

Macgregor recommends *sulphur ointment* and in severe cases *mercurial preparations*

Bonnafy observed good results from *sublimate baths* (20·0 to 30 0 to the bath) whereas Tribondeau attributes but little effect to this treatment

Relapses are frequently observed as isolated masses of fungi easily escape treatment and then form points of departure of new eruptions The fungous scales which collect in the underclothes in masses may also cause fresh auto infection It is therefore necessary to change and disinfect wearing apparel frequently

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IV

PINTA.

DEFINITION.

Under the term *mal del pinto* and various other designations, a dermato mycosis confined to the Western Hemisphere is indicated It is distinguished by the appearance of spots of different colours which give the patients a piebald appearance, but it causes no disturbance of the general health

SYNONYMS.

Mal de los Pintos Mal pintado Pinto Mal del Pinto Peint, Carate, Cute, Caratés, Tinna, Quirica, Spotted disease of Central America Pannus carateus (Alibert)

GEOGRAPHICAL DISTRIBUTION.

The disease, according to observations hitherto made, occurs almost exclusively in *tropical countries of the Western Hemisphere* It has been observed in Mexico, Central America, Columbia, Venezuela, Peru and Chili. [illegible] limited [illegible] more p[illegible] volcano [illegible] Guerrero—especially in Acapulco—and Tabasco in Venezuela the disease occurs, particularly in the provinces of Barquisimeto and Merida. It is most largely distributed in Columbia, where it is endemic almost everywhere

The disease known as *Lota* and which occurs in Surinam (Guiana) and on the Antilles, is perhaps identical with pinta.

Legrain (*Arch. de Parasit.*, 1898, Jan.) has observed a disease in the Sahara that exhibits all the characteristics of pinta.

SYMPTOMATOLOGY.

According to Gomez the appearance of the skin disease is preceded by a *prodromal stage*, consisting in shivering, with subsequent heat weakness of the limbs, indisposition, headaches, thirst, loss of appetite, severe perspiration, sometimes even emesis and diarrhoea This condition lasts for four to six days, and about forty days later the spots appear. Gastambide and Iryz do not mention these prodromal phenomena and it seems very questionable if they have any connection with the disease.

As a rule pinta develops very gradually. One or more small spots

form on the skin, particularly those parts that are exposed, such as the face, hands &c New spots develop near the first ones The spots enlarge and may become confluent so that occasionally the entire surface of the limbs is covered [illegible]
spots can be perceived
may be *pale grey to*
the disease the spots
later on, especially when the disease is long standing, spots of various colours are seen side by side Nevertheless no change of colour of spots takes place, the colour originally seen at the commencement of the disease is retained during its further course The borders of the spots are sometimes sharply defined and sometimes obliterated The pigment is sometimes increased in the vicinity of the white spots The latter, according to Montoya and Flórez, are the consequences of regressive lesions

The spots cause more or less *itching*, which increases at night with the warmth of the bed and desquamation of the epidermis takes place, *this at first is bran like, but later the skin is shed in scales of a few* millimetres in circumference

When the disease has lasted some time the skin of the affected parts is dry and coarse to the touch more rarely moist or greasy, sometimes also it is torn open or even ulcerated in consequence of much scratching

The patients diffuse a *disgusting odour*, which has been variously described as resembling that of a mangy dog damp dirty clothes, the urine of cats or musk

All parts of the body may be attacked by pinta with the exception of the palms of the hands and soles of the feet If the hairy parts of the head are affected the hair becomes thin and white, and at last falls out

The general health is not disturbed in pinta but the *disfigurement* caused by the seat of the disease in the face is very distressing to the patient whose appearance often reminds one of a painted circus clown

The disease develops very slowly, and its duration is unlimited It yields to suitable treatment and scrupulous cleanliness but mild relapses take place In other cases, however, it may persist for the entire life

ETIOLOGY

According to Gastambide s researches pinta is originated by a *fungus* The microscopical observation of the scales treated with liquor potassæ shows that there is an agglomeration of *spores* 6 to 8 μ in breadth and 10 to 12 μ in length between the epidermal cells They are either round or oviform and at the first glance appear to be uniformly black, examined however, with the light falling obliquely on them these spores will be seen to consist of cells surrounded by a transparent membrane which contains a large number of dark granules suspended in a yellow [illegible]

1

the filaments 10 to 20 μ [illegible] colour, sharply outlined and appear to refract the light they exhibit no trace of dichotomy and their base is somewhat broader than the somewhat stumpy tip When the spots are black and blue the fungus is situated in the superficial layers of the epidermis, when they are red and white, in the deeper layers, the colours of the spots, according to

Gastambide, are dependent on the different transparency of the unequally thick strata of skin under which the fungus has congregated According to another opinion the different colours of the spots are caused by different fungi

[illegible]

whites

The disease is *contagious* and can also be *carried* from one place to another.

Sex and *age* have no predisposing influence

DIAGNOSIS.

The skin diseases which under certain circumstances may be confused with pinta are *chloasma vitiligo* and *leprosy*

Chloasma and vitiligo spots are distinguished from those of pinta by the fact that they exhibit neither desquamation nor itching In chloasma, moreover, its connection with pregnancy, uterine disease, and other exhausting diseases must be taken into account In the differential diagnosis of pinta from leprosy, one fact above all others must be borne in mind, namely, that the spots in leprosy are anæsthetic and are usually accompanied by other symptoms

TREATMENT.

Before the parasitic [illegible] by the internal adminis[illegible] sium and decoctions of [illegible] *epiphyticidal* [illegible] and tincture [illegible]

PIEDRA —The disease of the hair known in Columbia (especially in the province of [illegible] have been set up

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V

ORIENTAL SORE

DEFINITION.

A CIRCUMSCRIBED inflammation of the skin that occurs endemically in various tropical and subtropical countries, especially of the Eastern Hemisphere has been described under various names, such as *Oriental sore*, *boil* (sore, evil, bouton, clou, mal) of Biskra, Gafsa, Aleppo, Bagdad, Delhi, Moultan &c Notwithstanding the different names only one disease is represented It is distinguished by a remarkably long course, and is characterised by the appearance of a nodule, the surface of which later on is covered by an eschar, and which is then transformed into an ulcer that finally cicatrises It seems to me that the appellation *endemic boil disease* is the most suitable for this complaint.

SYNONYMS.

GEOGRAPHICAL DISTRIBUTION.

The geographical region of distribution of Oriental sore extends over numerous *tropical and subtropical countries*

In the Eastern Hemisphere, commencing from the west, it is observed in Morocco, in numerous oases of the Algerian Sahara (Biskra), in the Sahara of Tunis (Gafsa), in the French Congo,[1] in Egypt, Crete, Cyprus, in the Crimea, Asia Minor an

(Delhi)

Juliano has also recently reported its occurrence in Brazil (Bahia)

Within this large region of distribution, however, the disease by no means rages everywhere, but is strictly limited to *certain towns and*

[1] The disease is here called craw craw (Emily)

districts This is the reason why the disease is often called after such places

The first accounts of Oriental sore extend back to the middle of the eighteenth century, and were given by Pococke, Russell, Hasselquist, Holland and Volney, who became acquainted with Aleppo boil in Syria, and reported upon it

ETIOLOGY.

Oriental boil is *contagious and auto inoculable to its bearer*, so that it may be spread over the body by scratching The contagion, as has been confirmed by successful experiments on human beings and animals (dogs, horses, rabbits), is contained in the *nodules* and the *secretions of the ulcers*

other insects probably play this *rôle*, and the disease may be also spread by washing, by articles of clothing, and by bath water The connection of the disease with the last named factors is insisted on in Taschkent (Capus) The drinking water theory which was formerly discussed has now been relinquished

The virus of disease is probably introduced into the human body through *injuries of the integument*, wounds, abrasions of the skin, scratched insect bites, eruptions, such as the pustules of acne, impetigo and inoculation, frequently forming the starting point of the disease As long as the endemic disease is rife, even the most trivial injuries have the tendency to be transformed into these boils

The *duration of incubation* varies. It generally fluctuates between a few days and a month In cases in which the disease only breaks out months or years after the affected person had left the infected district, subsequent infection had probably ensued from cocci, which had maintained their virulence in his clothing, &c. When the virus of disease has been directly introduced by inoculation, the period of incubation averages from a few to ten or twelve days

The fact of having once had the illness does not always afford protection from renewed attacks, the *immunity* acquired is occasionally only periodical or local, as repeated attacks prove, though it may be said that these are rare

The disease at various times sets in with unequal frequency, the *seasons* exercising some influence It is most often observed in the

ıcts This is the reason why the disease is often called after such es

he first accounts of Or ntal sore extend back to the middle of the eighteenth ury and were given by Pococke Pussell Hasselquist Holland and Volney, who me acqua nted with Aleppo boil in Syria and reported upon it.

ETIOLOGY.

Oriental boil is *conta ious and auto inoculable to its bearer*, so that it be spre l over the body by scratching The contagion, as has been firmed by successful experiments on human beings and animals (dogs, ses, rabbits), is contained in the *nodules* and the *secretions of the ulcers*

[illegible]

mbers of the family of a medical man returned from Euphrates con

[illegible]

only direct quitoes and also spread The connec isted on in as formerly

cussed has now been relinquished

The virus of d sease is probably introduced into the human body ough *injuries of the integument*, wounds, abrasions of the skin, atched insect bites, eruptions such as the pustules of acne, impetigo [illegible] t of the disease Is trivial injuries have

[illegible] fluctuates between a ease only breaks out nths of years after the affected person had left the infected district, bsequent infection had probably ensued from cocci, which had main ned their virulence in his clothing &c When the virus of disease has en directly introduced by inoculation, the period of incubation averages m a few to ten or twelve days

The fact of having once had the illness does not always afford otection from renewed att [illegible] unity acquired is occasionally [illegible] prove, though it may be said

[illegible] with unequal frequency, the tions exercising some influence It is most often observed in the

V

ORIENTAL SORE

DEFINITION

A r ro
var
sph
boil evil bouton clou mal) of Biskra Gafsa Aleppo B...
Delhi Moultan &c Notwithstanding the different names ...
disease is represented It is d
and is characterised by the app
later on is covered by an esch
ulcer that finally cicatrises It
boil disease is the most suitable

SYNONYMS

Endem

Taschkent jara i e Af
Taschkent jarassi i e ulcer o
Lupus endemicus (Lewis and Cunningham)

GEOGRAPHICAL DISTRIBUTION

The geographical region of distribution of Oriental sore
numerous *from*
In the Ea
in Morocco
Sahara of Tu
in the Crimea
Arabia (Yeme
in Turkestan (Taschkent and vicinity, especially along th ... oasis in the Turkmene
rivulet Tschirtschick) in India in the Punjab (Lahore
valley of the Indus in the Rajputana States and in
(Delhi)

Juliano has also recently reported its occurrence in
Within this large region of distribution howe
means rages everywhere but is strictly limited

The disease is here called craw craw (T

districts This is the reason why the disease is often called after such places

The first accounts of Ori ntal sore extend back to the middle of the eighteenth century, and were given by Pococke, Russell, Hasselquist, Holland and Volney, who became acquainted with Aleppo boil in Syria, and reported upon it

ETIOLOGY.

Oriental boil is *contagious and auto inoculable to its bearer*, so that it may be spread over the body by scratching The contagion, as has been confirmed by successful experiments on human beings and animals (dogs, horses, rabbits), is contained in the *nodules* and the *secretions of the ulcers*

Various authors (Deperet and Boinet Ducloux and Heydenreich, Riehl, Poncet de

A former opinion, that the ailment is only contagious in the districts

by washing, by articles of clothing, and by bath water The connec tion of the disease with the last named factors is insisted on in Taschkent (Capus) The drinking water theory which was formerly discussed has now been relinquished

The virus of disease is probably introduced into the human body through *injuries of the integument*, wounds, abrasions of the skin, scratched insect bites, eruptions, such as the pustules of acne, impetigo and inoculation, frequently forming the starting point of the disease As long as the endemic disease is rife, even the most trivial injuries have the tendency to be transformed into these boils

The *duration of incubation* varies. It generally fluctuates between a few days and a month In cases in which the disease only breaks out months or years after the affected person had left the infected district, subsequent infection had probably ensued from cocci, which had maintained their virulence in his clothing, &c When the virus of disease has been directly introduced by inoculation, the period of incubation averages from a few to ten or twelve days

The fact of having once had the illness does not always afford protection from renewed attacks; the *immunity* acqu red is occas onally only periodical or local, as repeated attacks prove, though it may be said that these are rare

The disease at various times sets in with unequal frequency, the *seasons* exercis … mo influence It is most often observed in the

V

ORIENTAL SORE

DEFINITION.

A circ

various tr

sphere, ha

boil (sore,

Delhi, Moultan &c Notwithstanding the different names only one disease is represented It is distinguished by a remarkably long course, and is characterised by the appearance of a nodule, the surface of which later on is covered by an eschar, and which is then transformed into an ulcer that finally cicatrises It seems to me that the appellation *endemic boil disease* is the most suitable for this complaint

SYNONYMS

GEOGRAPHICAL DISTRIBUTION.

The geographical region of distribution of Oriental sore extends over

(Delhi)

Juliano has also recently reported its occurrence in Brazil (Bahia)

Within this large region of distribution, however, the disease by no means rages everywhere, but is strictly limited to *certain towns and*

[1] The disease is here called craw craw (Emily)

districts This is the reason why the disease is often called after such places

The first accounts of Oriental sore extend back to the middle of the eighteenth century, and were given by Pococke, Russell, Hasselquist, Holland and Volney, who became acquainted with Aleppo boil in Syria, and reported upon it

ETIOLOGY.

Oriental boil is *contagious and auto inoculable to its bearer*, so that it may be spread over the body by scratching The contagion, as has been confirmed by successful experiments on human beings and animals (dogs, horses, rabbits), is contained in the *nodules* and the *secretions of the ulcers*

A former opinion, that the ailment is only contagious in the districts where it rages endemically but not in other places, has been contradicted by later observations Deperet and Boinet in France observed that a

from man to man but by intermediate hosts Flies mosquitoes and other insects probably play this *rôle* and the disease may be also spread by washing, by articles of clothing and by bath water The connection of the disease with the last named factors is insisted on in Taschkent (Capus) The drinking water theory which was formerly discussed has now been relinquished

The virus of disease is probably introduced into the human body through *injuries of the integument* wounds abrasions of the skin, scratched insect bites, eruptions, such as the pustules of acne, impetigo

point of the disease As most trivial injuries have

rally fluctuates between a few days and a month In cases in which the disease only breaks out months or years after the affected person had left the infected district, subsequent infection had probably ensued from cocci, which had maintained their virulence in his clothing &c When the virus of disease has been directly introduced by inoculation, the period of incubation averages from a few to ten or twelve days

The fact of having once had the illness does not always afford protection from renewed attacks, the *immunity* acquired is occasionally only periodical or local, as repeated attacks prove, though it may be said that these are rare

The disease at various times sets in with unequal frequency, the *seasons* exercising some influence It is most often observed in the

latter part of the summer and in the autumn, in subtropical regions it occurs from September to November, in the tropics at the commencement of the cool season (Hirsch)

Race, sex, age constitution and occupation play no part in the etiology of Aleppo boil [illegible] strong persons a [illegible] under which the [illegible]

In some plac [illegible] it usually occurs in early childhood, rarely, however, before 2 or 3 years of age Foreigners are more frequently exempt Generally ten or twelve months elapse from the period of their arrival before the onset of the disease (Smith), occasionally, however, they are attacked after a stay of from fifteen to thirty days

The disease is more frequent in *towns* than in the country

The Oriental boil occurs also in animals, notably *dogs*, in whom the snout is generally the seat of disease

SYMPTOMATOLOGY.

The ailment starts with a small red spot which resembles the bite of a mosquito In the centre a nodule of the size of a small hemp seed forms and gradually increases in size After this has been present some time a thin fluid exudes from its surface, this dries up and forms a yellowish scab, which being continually contributed to from within becomes larger and thicker Should this scab fall off, or should it be removed a small round ulcer is exhibited and this gradually advances at the periphery Very frequently several nodules surround the first one like a crown and these are transformed similarly into ulcers which become united to the primary sore The resulting ulceration, which may attain a diameter of from 8 to 10 cm, is of an oval or irregular shape Its borders are sharp, vertical, and jagged, as if eaten out, its base is covered by discoloured, hard, indolent granulations, which gradually break down, but are speedily replaced, the vicinity, however, is generally neither inflamed nor indurated The ulceration exudes a sero purulent secretion that is sometimes copious and sometimes scanty, at times drying up into a thick yellowish or blackish scab This sometimes does not fall off but remains sticking till the place is healed, then a round or oval concentric, stratified scab forms resembling a syphilitic sore After the ulceration has persisted several months without affecting the deeper tissues, healthy granulations appear in its fundus and slow cicatrisation, [illegible] Sometimes the [illegible] and [illegible] which the ailment is popularly known in Persia

The *cicatrix* left is more or less sunken, it is often pigmented and drawn together in a radial manner This frequently causes disfigurement, especially if situated on the face

In some cases it does not ulcerate at all The nodule attains the size of a pea or bean and this disappears again after a few months, followed at times only by a desquamation (Depéret and Boinet's *forme abortive* and *forme desquamante*)

The disease is usually unaccompanied by pain, the patients only complain of more or less troublesome itching at the part affected Should

the boils be situated on parts with but little subcutaneous tissue, such as the fingers or shins, they may cause severe pain. Disturbances of the general health never occur.

In syphilitic, scrofulous and scorbutic persons the ulcer assumes a

times there are only one or two, sometimes ten, twenty, or more, which ma fferent pla

The lim ext in frequency the face and neck, rarely the trunk and genitals In the latter case the disease may be mistaken for a phagedænic chancre In little children the face is usually the seat of disease It never occurs in the beard, on the hairy parts of the head, palms of the hands, or soles of the feet.

Weber observed 183 cases, in 87 of which the lower limbs were affected, in 73 the arms, in 17 the face and in 6 the trunk.

Emily mentions the frequency of relapses

PATHOLOGICAL HISTOLOGY.

Pathological researches on Oriental sore have been made by Carter, Riehl, Leloir, Unna, and Kuhn They all state that it is a *chronic sero-fibrinous* inflammation

There is an infiltration of the skin and subcutaneous tissue with small round oval cells, multi granulated and giant cells, and also a few leucocytes In the centre of the nodules over which the epithelium is attenuated, the infiltration is so dense that the tissue elements are entirely d
an all centres, n
sweat glands,
much œdema
enclosed, and th
tissue otherwise a
according to h
always exl ibit a
and there the
obliteration

DIAGNOSIS.

The diagnosis of Oriental sore as a rule presents no difficulties Confusion with syphilis, lupus, scrofula and leprosy are easily avoided, especially if the lack of other ailments as well as the history of disease are taken into account Geber, nevertheless, states, on the grounds of his experiences gathered on a journey through the East, that in the Orient there is much abuse of the diagnosis "Aleppo boil," and syphilitic, lupous and scrofulous affections are confused with it.

PROGNOSIS.

The prognosis, as a rule, is *favourable*, if one excepts the disfigurements that are apt to ensue from contraction of the cicatrices, especially on the

face Death rarely results, but should it occur it is due to some intercurrent complication, especially erysipelas

PROPHYLAXIS

If the opinion be correct that the virus of disease penetrates into the human body through the skin, the greatest protection from the disease will be afforded by the most scrupulous cleanliness, frequent ablutions with soap, care in avoiding injuries of the epidermis and, in case of such *injuries occurring, their careful treatment*

TREATMENT.

During the first stage of the disease some authors recommend *cauterisation* with nitric acid, carbolic acid, caustic potash, sulphate of copper *pencil but above all with the actual cautery*, whereas *other authors* denounce such treatment as injurious *Scraping out* the nodules with the sharp spoon and also *excision* have been resorted to Most observers, however, advise an *expectant* treatment

Should the ulcer be covered with a scab it should not be removed but protected by a simple bandage for experience teaches us that the ulcerations heal well under such scabs Ulcers should be bandaged antiseptically, or treated with such ointments as boric, salicylic or iodoform Powders also, such as calcined alum should be used in order to induce the formation of eschars Emily achieved favourable results with boracic acid, which, after previous thorough disinfection with sublimate, is dusted thickly over the ulcers, which are then covered with a tight bandage

In order to shorten the duration of the disease, the removal of patients from the region of infection is indicated

A peculiar 'boil disease that occurs in Bucharest and which is designated *Bucharest boil* is not identical with the ailment described above Finkelstein[1] describes its clinical course as *follows* —

A painful nodular induration appears on any part of the body subsequent to sensations of pain after two or three weeks the lump exhibits fluctuation and intermittent fever with rise of temperature up to 40° develops After the abscess has

rarely leads to a fatal issue [illegible] of 18 and 25 are mostly attacked Whereas the

plague.

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VI

ULCERATING GRANULOMA OF THE PUDENDA.

During the last few years a new venereal disease has been described under various appellations, such as *groin ulceration sclerotising granuloma of the pudenda, chronic venereal sores das venerische granulom*, it is distinguished by its granular character, its great extent, and its exceedingly chronic course

The first publication (1896) came from Conyers and Daniels, who observed the disease in British Guiana in *negroes* and *East Indians*,

… had sexual intercourse with them, and also in a *white man* who was in the habit of having connection with a native woman Probably also the disease observed by Dempwolff in New Guinea in Melanesians and Papuans was of this nature

The disease presents itself as a light red, shiny mass of granulation tissue that easily bleeds it is of various sizes, exudes a thin light

places by shrivelling up leaving firm raised hairless cicatricial tissue with a thin epidermal integument, and which is in parts lighter, in parts darker than the skin in the vicinity Sometimes these cicatrices lie like islands in the masses of granulation sometimes cicatrisation occurs at one side and the disintegrating process advances on the other In consequence,

inguinal region, thigh perineum vicinity of the anus, as far as the coccyx and buttocks, are the seat of the disease

In exceptional cases the disease is observed on other parts of the body Maitland in one case saw it on the inner surface of the cheek, in another case on the inner surface of the lips gums, and side of the tongue, and the wife of one patient presented a similar affection of the mouth

The disease, according to Conyers and Daniels, commences with a nodule, in men mostly on the pubes or in the inguinal region, sometimes also on the prepuce or the glans penis, in women it commences on the labia or in the vagina, while, according to Maitland, a chancre or a suppurating bubo following a chancre always forms the starting point of the disease

The spread of the disease takes place partly by continuity, partly by contiguity

From the skin the disease may reach the mucous membranes, as from the penis to the urethra, from the labia pudenda to the vagina, from the vicinity of the anus to the rectum, and *vice versâ*, and strictures of the rectum and urethra may be set up in consequence of cicatrisation As a rule, however, the process is confined to the superficial tissues, to the skin and subcutaneous cellular tissues, and does not penetrate deeper Fowler alone mentions a case in which the disease passed from the left groin to the bladder, which resulted in the formation of a urinary fistula An elephantiasis like condition sometimes develops on the penis and scrotum without any complication with filarial disease being present

The spread of the disease is slow, even in cases when it was rapid at the commencement, so that the process extends over many months or years T [illegible]

The [illegible]

The [illegible] ither but little [illegible] es of long duration that the patients become anæmic and enfeebled in consequence of the considerable discharge, and finally succumb to exhaustion

Galloway, who received the material from Daniels, reports that according to histological researches the granuloma appertains to the *infectious granulation tumours* The disease commences with a small celled infiltration in the upper part of the corium and in the papillæ, the interpapillary epidermal processes then increase considerably in length and the connective tissue of the corium disappears, so that large masses of the small celled infiltration lie under the elongated epidermic cones The cells are mostly plasma cells, not ordinary leucocytes The epithelium of the surface is very thin and atrophied and is absent in places The vessels of the cutis are widely dilated The glands in the deeper strata of the cutis and subcutis are mostly normal, some, however, exhibit cystic dilatation In the older parts of the neoplasms newly- [illegible]

[illegible] n

[illegible] tal

transmissions conducted by Conyers and Daniels on guinea pigs had negative results The unknown virus of disease is undoubtedly contained in the secretion from the granulations The seat of the ailment on the genitals and the frequent primary affection of the penis in the male and the vagina in the female combine to indicate a disease of a *venereal character* Nevertheless, it has no connection with syphilis, this being proved by the inefficacy of anti syphilitic drugs Complications with syphilis, however, occur occasionally Maitland s observations point to the probability that venereal ulcers may form the point of entrance for the disease

The disease is mostly observed in *adults*, never before puberty

As has been gathered from the few reports published the disease occurs in the most diverse races Race therefore plays no essential part in its etiology.

The *diagnosis* of pudendal granuloma should usually present no difficulties It is particularly distinguishable from soft chancre and syphilitic affections by its granular appearance, its great extent and, above all by its chronic course It is also not difficult to differentiate it from Oriental sore and yaws

The *treatment* consists in scraping out the masses of granulation with subsequent cauterisation, for which purpose the thermo cautery, chloride of zinc, sulphuric acid, Vienna paste &c, may be used Bandages with antiseptic solutions are then applied The excision of the entire granular and cicatrised mass is also recommended Conyers and Daniels achieved good results from acidi salicyl 1 8—2 4 to 30 0 ungt creasoti[1] Daniels also found that large doses of iodide of potassium (1 8—2 4 three times a day) was not entirely without effect, as it assisted any tendency to cicatrisation

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lacerated wounds, such as may be got on the feet and legs through walking barefooted on sharp stones or thorns, the stings and bites of insects eruptions in which there is a solution of continuity of the epidermis as for instance eczema, syphilitic and other ulcers originating from endemic boils

According to Bechtinger the disease may also develop independently of cutaneous injury commencing as little blisters that rise on the uninjured skin and burst after from twelve to thirty six hours existence

The *lower extremities* are usually the *seat* of disease especially the dorsum of the foot and the shin no doubt owing to the fact that these parts are most exposed to injury More rarely the thigh is attacked and more rarely still the scrotum and the upper extremity, especially the hand and forearm

Sometimes the same individual is attacked by the disease on several parts of his body

Sloughing phagedæna presents an ulcerative surface spreading by necrotic disintegration of the elementary tissues The surface of the ulcer is covered by unhealthy granulations covered by stinking pus and sloughs, or with a greyish pseudo membrane adhering to the tissues below The edges of the ulcer are irregular and undermined, the surrounding skin has a bluish tinge, but is not swollen to any great extent The ulcers exude a copious secretion and bleed easily the slightest blow, even a touch suffices to cause at times considerable hæmorrhage They rapidly extend not only along the surface so that they cover the entire leg and sometimes the entire lower extremity but they also extend in depth muscles tendons and bones being laid bare and necrosed Sometimes large cavities filled with a foul greenish mass and swarming with maggots are found in which pieces of gangrenous muscles green coloured shreds of nerves and tendons appear Articulations are also sometimes opened and the small bones of the tarsus or metatarsus, or even entire toes are shed Arteries also may be opened, causing dangerous or even fatal hæmorrhage

The exceeding painfulness of the diseased parts the sleeplessness caused by such pain with the drain on the system from the discharge, combine to reduce the strength of the patients more and more, they become cachectic, septic fever and diarrhœa set in and death may ensue from exhaustion or septicæmia

In other patients—and this is more frequently the case—the necrotic process stops short sometimes suddenly without any perceptible reason the dead tissue is cast off healthy granulations shoot up the ulcerative cavity is filled up and after weeks and months cicatrisation sets in or the atonic phagedænic ulcer is transformed into an ordinary chronic ulceration

Sometimes more or less considerable deformities and mutilations are left, toes are lost anchylosis and contractures may form in consequence

of the cicatricial contractions, the long period of inactivity may lead to muscular atrophy, and so on

According to Blaise *relapses* induced by attacks of fever are frequent

Treille differentiates two distinct *forms of the disease*, a mild and a severe

TREATMENT.

The first desideratum is to establish, if possible, a better state of the general health by nourishing food, wine, quinine and iron Should syphilis be present the use of specific remedies, especially iodide of potassium, is indicated

Local treatment is best *begun by thoroughly scraping out the base of the ulcer with the sharp spoon*, or to arrest the spread of the disease by destroying the surface and margins of the ulcer with caustics (fuming nitric acid, chloride of zinc, hydrochloric acid, &c) or with the actual cautery whilst the patient is anæsthetised According to Dempwolff, after

[illegible]

a half, in the interval the ulcers were dressed with compresses smeared with boric vaseline, this observer found that good results followed his treatment

[illegible]

[illegible] see The [illegible] skin from [illegible] pper arm [illegible] ese cases [illegible] far more [illegible] grafting of pieces of skin on the ulcer itself, be they ever so well prepared

If the patients are much reduced in strength and the ulceration so extensive that there can be no hope of healing it, *amputation* of the affected limb is indicated

Change of climate is supposed to exercise a favourable influence on the course of disease

[illegible]

[1] [illegible] 1898, No. 8.

[illegible]

[illegible] G. H. Ivory [illegible]
[illegible] lower [illegible]
[illegible] West In[illegible]



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of severe pains in the head these however cease after six months or a year The later course of the disease is almost quite painless Chalmers mentions that pains occur in the bony growth in wet weather At first also there is frequent bleeding from the nose and muco purulent or sanguino purulent rhinorrhœa

When the tumours have attained considerable dimensions they obscure the line of vision and cause the patients to squint atrophy of the eyeball occurred in a case recorded by Maclaud

No further discomfort apart from the disfigurement are induced by the disease which persists for many years No signs of inflammation are observed in the tumours

that the tumours always developed during or soon after that ailment

The affection is not hereditary It is observed more frequently in men than in women

In regard to *treatment* removal of the tumour is the only expedient

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X

MADURA FOOT.

DEFINITION

This is a disease that occurs principally in Ind a it is usually s tuated in the foot and is or ginated by vegetable parasites Madura foot is characterised by an unshapely tuberculated swell ng with cysts containing the parasites and permeated with fistulous tracts

NAMES

The d sease is called *Pada al icum* in Sanskr t *Perical* or *Ana cal* n Tam l *Sl pada* n Bengal *Hatty ka Pung* n Deccan des gnat ons that s gn fy large foot or elephant foot *K rina grah* dwell ng of worms s ts name n Rajputana

doctors
d sease

HISTORY

Kampfer (1712) was the first European doctor who ment oned this d sease under

GEOGRAPHICAL DISTRIBUTION

It was believed until recently that Madura foot only occurred in Ind a however cases of this disease (Bérenger Feraud [1] Duval [2] Vincent Legrain) North Hyde and Senn) Ch li its region of distribu bserved three cases in r had probably been

Ind an vernaculars [1] According to Le Dantec [2] Accord ng to Vincent
Delbanco on the grounds of the material sent to him for exam nat on by Hyde and Senn believes that the r case was not one of Madura foot but one of act nomycosis

In India it is the *Presidency of Madras* in particular in which Madura foot is endemic, and there it is found in Bellary, Guntur, Cuddapah, [illegible] Karikal Tanjore, Trichinopoli and other [illegible] e disease occurs on the declivities [illegible] Poona, Kattywar, Gujerat, Cutch, [illegible] in the *Bengal Presidency*, but is observed in Bikaneer, Bahawalpore, and other districts of Rajputana, in Delhi, Hissar, Jhelam (in the Punjab) and in Bengal I saw an Indian with Madura foot in Colombo, Ceylon

SYMPTOMS

One of the feet, usually the right is the most frequent *seat of the disease*, but sometimes also the hand is affected Occasionally it is confined to one toe or one finger In rare cases the leg may be attacked, the disease proceeding from the foot to the ankle and thence to the leg In a case recently published by Keith Hatch and Childe, the disease was situated in the region of the knee the foot not being affected Other parts of the body are only exceptionally attacked Maitland once observed the disease on the thigh and abdominal wall Smith saw it once on the neck According to Collas *Epulis gravis*, the *pseudo cancer* of the inferior maxilla, which is observed in Pondicherry, is identical with this disease It is exceedingly rare to find the simultaneous occurrence of the disease on different parts of the body

It is very seldom that medical men have the opportunity of observing the disease at its very commencement for the natives only present themselves for treatment when the disease has made considerable inroads The disease begins with the development of one or several small hard *nodules* in the subcutaneous tissue, which are painless or only sensitive on being touched and which grow slowly Carter states that he has observed as an initial sign preceding the appearance of the nodules, reddish lines in the depth of the skin

The first nodules are usually situated on the sole of the foot but they may appear on the instep or between the toes After several months they come to a head burst and discharge the contents (to be described below) through fistulous openings [illegible]

[illegible] these changes has become more or less cylindrical or oval The toes are pushed far apart or deviate from their normal position in other ways, [illegible]

[illegible] spherical more or less symmetrical, shape Sometimes they are distinctly outlined, sometimes more diffuse, part of them hard, insensitive and covered by normal skin, part of them dark red soft, fluctuating and sensitive to touch

Between the prominences and nodules there are numerous warty, raised, or funnel shaped *openings*, surrounded and partly covered by pale red granulations which are not sensitive and do not bleed readily, these

are the result of the perforation of nodules The probe may be passed through these openings into sinuous fistulous tracts, more or less deeply, into the interior of the foot, and may even penetrate into the bones If the disease is far advanced the probe nowhere meets with resistance, but easily penetrates the softened caseous mass in all directions There is

hin, sanious, dirty white or
which is sometimes streaked
bodies to be described later,

side by side in the same patient

The bodies of the *pale variety*, which are reminiscent of the spawn of fishes, vary in size from a pin s head to a pea and even larger, the smaller bodies are of a round or oval shape, the larger have an irregular outline and are grey, yellowish or reddish in colour and of a soft dough like consistency, these bodies are not soluble in ether, potash or acetic acid, which controverts Lewis and Cunningham's assertion that they are of a fatty nature

In the *black variety* the bodies vary in colour from brown to black (Bristowe s truffle shaped bodies) and they resemble grains of coarse gun powder Their size and shape is similar to that of the white variety, they are, however of firmer consistency, but nevertheless can be broken up

The microscopical examination of these little bodies shows that they consist of fungoid elements

the black bod es contain no

The quantity of liquid exuding from the openings appears to be and increase
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1899 March 5, p 622) the skin
coarse papillary
cysts filled with
papillomatosum

On palpation the diseased foot communicates a sensation of elasticity, or as if one were pressing on a thin sheet of metal Impressions with the fingers leave no pits

Sensibility is maintained There is, as a rule, no *pain* at all Some times the patients complain of a dull sensation of pain on pressure Exceptionally cutting or shooting pains are observed extending to beyond the knee In one of Legrain's patients the leg was very sensitive to cold, and in winter and in damp weather pains developed in the leg

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and that the
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of years, the
patients suffer from anæmia and cachexia, the condition is less attributable to the disease itself than to the misery and want to which the sufferers—mostly belonging to the lowest classes of population—are reduced, in consequence of their inability to earn a living

The disease has a very *chronic course* There is no tendency to heal Although it may happen that a few nodules disappear and a few fistulous tracts close and heal leaving cicatrices that are first white and later on pigmented and radiated the disease systematically advances If left to itself, *i e*, without operative interference the patients at last perish from exhaustion, diarrhœa or other intercurrent diseases nevertheless the disease from its commencement to the death of the sufferer may persist from ten to twenty years

PATHOLOGICAL ANATOMY

When an incision is made through a foot or any other part of the body in which the disease is fully developed, it will be seen that beneath the thickened skin all tissues the connective tissue as well as the muscles and bones, are transformed into a similar viscid jelly like mass of a grey or reddish colour, so that the knife can be pushed through in every direction without encountering much resistance The jelly like mass is permeated by numerous spherical cysts of various sizes and from these again there lead sinuous canals some of which have a blind termination and some of which open out through the skin The cysts as well as the sinuses, are filled with peculiar masses of fungi sometimes of a grey or yellowish sometimes of a brown or black colour they are usually designated mulberry shaped bodies and are of a doughy consistency

parts

This disease therefore is undoubtedly attributable to an *invasion of vegetable parasites* which disintegrate and transform the tissues of the affected part. The connective and adipose tissues around are transposed into a condition of chronic inflammation which leads to a neoplasm of connective tissue The adventitia of the vessels becomes thickened The muscles according to Corre ...

and its consequences are exhibited at first In a later stage softening and atrophy of the compact tissue sets in and honeycomb like cavities crammed with the parasites form in the cancellous tissue Never or but very rarely however, do the bones become carious The smaller bones

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The quantity of liquid exuding from the openings appears to be different in different patients it seems to decrease with rest and increase with motion *If the secretion is slight the fluid dries up on the granula*tions in thin eschars which are easily loosened and shed when the flow is increased

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The great unshapely foot forms a strange contrast with the emaciated leg, consisting almost only of skin and bone Collas found that the inguinal glands of the diseased side were much enlarged, but painless In exceptional cases other lymphatic glands become affected

Locomotion is hindered by the swollen foot, and later on the patients become quite incapable of walking at all

The *general health* and the *condition of nutrition* remain undisturbed for a considerable time When at last, after the course of years, the patients suffer from anæmia and cachexia, the condition is less attributable to the disease itself than to the misery and want to which the sufferers —mostly belonging to the lowest classes of population—are reduced, in consequence of their inability to earn a living

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may vanish entirely. The tendons and aponeuroses possess the greatest power of resistance against the parasitical invasion, and therefore remain almost intact.

In the case recorded by Keith, Hatch and Childe [illegible]



FIG 58.—Madura foot. Two fungoid glands surrounded by a zone of suppuration and fibrous granulation tissue.—Zeiss, Obj D, Oc 2

Kanthack differentiates three stages of disease in the *white variety* In the *first stage*

n which granula on t uo deve ops w th a z ne of leucocytes and closely surr und the

In a fe v cases (Lew s and Cunn ngham) no masses of fungi were found in the cysts and s nuses which only conta ned a purulent oily mater al

ETIOLOGY

vegetable pa as tes cter of the d ease h s v ew and t was Berkeley also succeeded n cult vat ng a h therto unknown fungus from a preparat on sent to h m by Carter and to wh ch out of compl ment he gave the name *ch on jpl c Carteri* He himself however subsequently den ed its et olo g cal s gnificat on

After the d scovery of act nomycosis n Europe Carter was the first to po nt out the s m lar ty of the two d seases and Hewlett and others even declared them to be dent cal

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In the case recorded by Keith Hatch and Childe, in which the region of the knee was affected the bones apart from slight osteophitic formation at the internal condyle of the

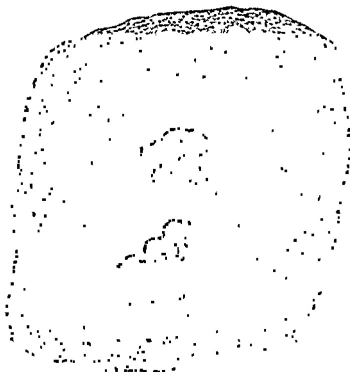


FIG 58.—Madura foot Two fungoid glands surrounded by a zone of suppuration and fibrous granulation tissue —Zeiss, Obj D, Oc 2

In a few cases (Lewis and Cunningham) no masses of fungi were found in the cysts and sinuses which only contained a purulent oily material

ETIOLOGY

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After the discovery of actinomycosis in Europe Carter was the first to point out the similarity of the two diseases and Hewlett and others even declared them to be identical

This view however is contravened on radically important grounds
; of the fungoid masses
and the difference of

organs and
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myces on the other hand is not stainable with hæmotoxylin and develops clubs and knobs which are difficult to sta n Recently also Vincent by means of pure cultures has furnished proofs—at least as regards the white variety—that the masses of fungi found in Madura foot do not belong to the actinomyces but to a species of streptothrix des gnated *streptothrix maduræ* by th s observer

Kanthack had previously declared that the parasite appertained to the class of *streptothrix* (Cohn) or *oospora* (Wallroth) and suggested the name *oospora indica* for it whereas Nocard and Blanchard des gnate it *discomyces Maduræ*

Th mq

med um

In the *black variety* it is either the question of a degenerative form of the pale variety or of some other variety of the same fungus Kanthack as the result of his researches mentioned above is incl ned to the former view Possibly the d fferences of colour exhibited by the pale variety is caused by different kinds of fungi Madura foot probably like actinomycosis and trichophytosis is not a clinical entity but a complexity of diseases not yet sharply differentiated one from the other of which each has its particular cause Hitherto Le Dantec has been the only investigator who has succeeded in obtaining cultures of the black variety His discovery however does not coincide with the results of the micro scopical investigations so that we have to await confirmation of his discovery

No	Cultures or Inocn at ons	Streptothr x Ma iuræ	Act no nyces
1	Peptonised beef tea	Moderate growth	Luxuriant growth
2	Sterilised infus on of hay or straw	Pr nc pal nutrit ve soil growth rap d (four days) and luxuriant	No growth
3	Ord nary peptone gela t ne	Does not liquefy	Liquefies
4	Gelatine w th infus on of hay	Very quick growth the culture becomes p nk or red on the surface	Whit sh very weak cul ture
5	Glycerine gelat ne	Colonies wh ch at first are wh te then p nk or red and provided with a sunk centre	At first white later on greyish spots folded.
6	Potato	Br ght p nk vivid or dark red culture does not brown the substratum	Close wart l ke yellow and white black edged colon es potato b comes brown
7	Cabbage yellow turnip carrot	Growth	No growth
8	Serum	No growth	Growth.
9	Egg		Growth.
10	Cultures in areas depr ved of air		Facultatively anaerobic
11	Inoculations	Not transferable to any animal	Transferable to rabb ts guinea p gs calves

whether made in bouillon or on solid nutritive media, gradually become reddish rust coloured Gelatine was liquefied by the bacilli Experimental transmissions to rabbits and guinea pigs failed.

The origin of Madura foot, or of the parasite that generates the disease, is unknown

It has been endeavoured to trace the cause of Madura foot to various soils, but without success, it has been proved, however, that the disease has been observed in regions which, in so far as the sorts of soil and the species of flora incident to them is concerned, show great diversity Its limited appearance, however, seems to point to the fact that the parasite is associated with certain local conditions Probably the parasite is a saprophyte living on plants

Racial peculiarities play no part in the etiology of Madura foot The disease has been observed in persons of the most diverse races (Hindoos, Eurasians,[1] Kabyles, North Americans, Mestizoes, Italians, &c)

The disease has not been observed in Europeans in India, whence the greatest number of the observations originate Their immunity, however, is certainly less attributable to racial difference than to the more favourable *hygienic conditions* under which the whites live, and above all to the fact that they all *wear foot gear* As to the natives, no caste, no class is spared, the disease occurs in the Mussulman as well as in the actual Hindoo, it is, however, most frequent *amongst the lowest classes of the population*, who live in mis[illegible] *agricultural people* In cont[illegible] it is very seldom seen in l[illegible] to Carter, is attributable to [illegible] the European residents

Walking barefoot plays a prominent part in the genesis of this disease This custom affords opportunity for *injuries* caused by stones, thorns (Bocarro often found thorns of the acacia arabica embedded in the swelling), prickly plants &c, from which Hindoos notably suffer frequently The invasion of the parasites may then take place through the injured skin, or the substance causing the injury may be the carrier of the infection Carter considers that the sweat glands form the point of entrance for the parasites The similarity of Madura foot to actinomycosis leads one to consider the possibility of injury by means of corn (bristles, &c) beset with fungi piercing the skin This would explain the frequent occurrence of the disease amongst the country folk, they being particularly exposed to such injuries

[illegible]

affected knee

In regard to *sex*, *males* are much more frequently attacked by the disease than females Carter computes the proportion as about 10 · 1 In this connection, however, it must be remembered that Hindoo women,

[1] Offspring of Europeans with Indian mothers

in consequence of their usages and religion, seek medical treatment far less frequently than men (Corre)

The disease occurs most often during the prime of life, between the 20th and 45th year, very rarely earlier, somewhat more frequently in later years. It is unknown in childhood.

DIAGNOSIS.

The diagnosis of Madura foot presents no difficulties. It is easy to avoid confusing it with carcinoma, sarcoma, tuberculosis, syphilis, nodular leprosy or elephantiasis, and with dracontiasis and endemic Oriental sore. The differences between Madura foot and actinomycosis have been pointed out above.

PROGNOSIS.

The disease is incurable, but when an operation is performed in due time the prognosis, *quoad vitam*, is good.

PROPHYLAXIS.

As the disease in most cases may be traced back to injuries of the foot, it seems that the most practical method of avoiding it is the wearing of shoes or sandals. Moreover, care should be exercised to keep the feet clean.

TREATMENT.

The treatment of Madura foot is principally *surgical*. In the early stages of the disease cauterisation is indicated by means of the actual cautery. Paquelin's cautery, or escharotics, especially caustic potash eradication by scraping, followed by injections of iodoform—glycerine—emulsion, have also been tried. In suitable cases extirpation of the nodules may be undertaken. In addition, interstitial injections of solution of chloride of zinc may be tried. If, however the disease is already advanced, *amputation* is the only remedy left; this gives a good prognosis provided that all diseased parts are removed. Sometimes there is latent disease of the bones of the legs, therefore amputation must be made through the healthy tissues. Provided this is done a recurrence of the disease may be prevented. Collas has performed this operation in 126 cases, 117 successfully, in only two cases did relapse occur.

Medical treatment in Madura foot is reckoned to be useless. Iodide of potassium, which in actinomycosis of man and beast has been used with favourable results, has proved to be inefficacious in Madura foot.

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For less recent literature see Hirsch iii p 430

[illegible] ira Foot occurring

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XI

AINHUM.

Ainhum is a disease that occurs principally in negroes, it affects single toes and is characterised by a ring shaped constriction which finally leads to amputation

NAMES.

The word ainhum originates from the negro language, and signifies "to saw," because the stump left looks as if sawed off In the Soudan the disease is called *Banko kérendé*, in India *Sukha pakla* (i e, dry suppuration), in Brazil *Quigila*

GEOGRAPHICAL DISTRIBUTION.

The disease has hitherto only been observed in the coloured races, principally in *negroes* The *West Coast of Africa* forms its principal seat Clarke (1860) was the first to report a "dry gangrene of the little toe among the natives of the Gold Coast Moreover, cases are reported from the Soudan, Algiers, Egypt and the Northern part of the Transvaal Next to Africa the largest number of cases of ainhum have been observed in Brazil, although latterly it is not so prevalent as formerly, the reason for this being probably, as Da Silva mentions, attributable to the number of negroes having decreased there The occurrence of isolated cases, particularly in negroes, has also been reported from Buenos Ayres, British Guiana, the Antilles, from a few States of North America, from [illegible] Island [illegible] *[illegible]doos* in [illegible] sons of the *Semitic* race

SYMPTOMS OF DISEASE.

One or both *little toes* are as a rule the *seat of the disease* In the latter case the toes are either attacked simultaneously or one subsequent to the other In one of Dupouy's cases almost twenty years elapsed between the disease of the two toes, in one patient of Duhring's there was an interval of thirty years The disease sometimes occurs to the fourth toe, but this is much more rare Da Silva compiled fifty cases of ainhum, in forty five of which the fifth toe, and in five of which the fourth toe was affected Guimarães twice observed ainhum on the fourth and fifth toes of the same foot, Gongora saw the disease once on the second toe, and Cooper saw it once on the big toe In one case of

De Brun s the five toes of the one foot were all attacked but only the fifth toe of the other foot

Guyot states that he observed the d sease on the fingers also to me however it seems doubtful if these cases occurring in Pine Island and the G lbert Islands were really related to ainhum

The disease comr
groove develop ng on
digito plantar fold.]
surfaces and at last
taneously also deepens so that a deep groove surrounds the l mb which

or three times its
natural colour and
the toe at last
l directions like a
rmed outwards on
The na ls mostly
napen (Weber) or

off spontaneously the patient is bound to resort to a surg cal removal of the toe an operat on which is either undertaken by the patient himsel or by a surgeon

Somet mes small foul smelling ulcers develop in the groove

If the part is cast off spontaneously a small wound remains wh ch mostly c catrises in a short t me leaving a small round sh stump In rare cases ulceration pers sts

In a series of cases *tropl c vasomotor se sory* and *motor disturba ces* particularly of the affected lower limb were observed serving to demon strate the presence of a nervous affect on Thus Collas and Da Silva Lima found the
the other parts
case observed b
coloured to a
exh b ted desq
swollen and ur
affected lower limb was thickened and on the dorsum of the foot shrivelled there was desquamat on on the sole the growth of hair was increased the muscles wasted sens bility decreased the plantar and

symptom and these pains were occas onally so severe that the pat ents could neither walk nor eat

There is never any d sorder of the general health

The *course of the d sease* is very slow Usually several years elapse

till the constriction of the part has advanced to such an extent that the patient resolves to have it removed, it even takes much longer, from five to ten

Relapse

Gongora ob

langes were

the stump and led to the casting off of the proximal phalanx

PATHOLOGICAL ANATOMY.

The anatomical and histological examinations hitherto made of toes, some of them spontaneously cast off, and some of them surgically removed, have furnished no specific conditions All investigators coincide in the opinion that the constricting ring is formed of fibrous tissue, into which all other tissues are merged and over which the epidermis is considerably thickened In the amputated part the epidermis also exhibits some slighter thickening and the *subcutaneous adipose tissue is very strongly developed*, similar to that of lipoma accounting for the swelling of the limb The bones have partly disappeared, being transformed into fibrous tissue or their medullary spaces are enlarged at the cost of the bony tissue, the medullary spaces are also not filled as in the normal with red marrow, but with fatty cells which are embedded in a relatively rich stroma of connective tissue The interphalangeal articulations are sometimes anchylosed their cartilage being transformed into fibrous tissue

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Dul

mat

œdema '

Eyles places the changes of the *epidermis* in the foreground, and regards it as primary

Further researches are required for the elucidation of the histology of ainhum In any case the old opinion that in this disease it is a question

primarily of neoplasms of contracting connective tissue at the place of constriction, and of proliferation of adipose tissue in the diseased toe itself in consequence of disturbed nutrition, is in my opinion quite exploded

ETIOLOGY.

The *cause* of ainhum is up to the present quite obscure Da Silva of opinion that *injuries to the toes* caused by going barefooted induce the disease, but this view is negatived by the fact that the ailment is also observed in free negroes who usually wear foot gear Gongora asserts that the disease is the effect of sheer perversity in the patient who ties a string tightly round the toe to *mutilate* himself This statement is obviously incorrect and unconfirmed

The *wearing of rings* on the toes is an equally groundless reason given for the cause of ainhum

Various observers especially Proust connect the disease with *congenital spontaneous amputations and constrictions of the skin* which come to pass during fœtal life through the constricting effect of amniotic filaments These, however, are congenital and occur on various parts of the body, they are not limited to the toes, are generally multiple and frequently occur simultaneously with other deformities they therefore differ essentially from ainhum

Zambaco is the principal exponent of another view—that ainhum appertains to leprosy This author says L'Ainhum des nègres Nagos, est une léprose legère monosymptomatique, dactylienne podique c'est a

osy in rare

but they

joined with

in a few

cases of ainhum are by no means characteristic of leprosy but comprise disturbances that are apt to be set up in the most various diseases of the nervous system and seem to indicate that in ainhum a *tropho neurosis* may be present The lumbar pains observed by Dupouy in his patients seem to have some connection with this cause

Despetits and Corre regard ainhum as a circumscribed, circular (*i e*, linear) *scleroderma*

The disease predominates in the *male sex* in *youth* and in the *prime of life*, but it is also observed in women and children Guyot saw a case in a child of six weeks old perhaps this however, was a case of congenital amputation

Heredity plays some part in the etiology of ainhum Da Silva Lima states that he knew a few negro families of whom every member was attacked by the disease The case observed by Duhring related to a negro whose father had lost two toes from ainhum, and whose mother at the time of his illness was also suffering Dupouy communicates the case of a negro, whose father and two of whose brothers had likewise had the disease

DIAGNOSIS.

Its relations

It is, however,

PROGNOSIS

The prognosis of the disease in regard to life is good

TREATMENT

The only treatment consists in the removal of the pendant member by means of the knife scissors or by ligature with a string At the commencement of the ailment and before the constriction is very pronounced an effort may be made to resist the encroachment by deep vertical incisions in the constricting circle Da Silva states that a complete cure has been accomplished in some cases by this means

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VI.—THE COSMOPOLITAN DISEASES IN THE TROPICS.

Having in the previous chapters discussed the diseases peculiar to the warm countries, I shall now proceed in the following pages to briefly describe the occurrence and relation of the endemic diseases appertaining to all zones, and which have therefore been appropriately designated *cosmopolitan diseases* in this connection the diseases occurring in subtropical countries will incidentally be considered for purposes of comparison

The different climatic conditions which prevail in warm countries, the various races which are there attacked, and the divergent conditions of life and civilisation found in the tropics, would *a priori* have an influence on the characteristic features of many ordinary ailments I shall not consider minutely in this chapter the geographical distribution of disease but refer the reader to Hirsch s classical work, nor shall I mention the source of information as the data referred to here are too scattered and multifarious

I commence with the *infectious diseases*, which always occupy a prominent position in geographical pathology

Typhoid —At a time when every fever occurring in the tropics was regarded as malaria the opinion prevailed that hot countries were quite immune from this disease More recent observations, however, have proved that this view is untenable and that, on the contrary, typhoid rages extensively in the tropics and is more severe in type and more liable to relapses than in Europe On the other hand, however, remarkably mild typhoid attacks occur, and to these the cases observed by the Italians in Massana (camp fevers) that seldom last longer than a week, and some of the so called climatic fevers, appertain Typhoid in the tropics exhibits local and periodical variations in the same manner as in temperate climates In the dark races, however, the roseola as may be imagined, easily escapes observation

Exanthematous typhoid has hitherto not spread extensively in tropical and subtropical countries Epidemics of the disease have been observed in Tunis, Algiers Nubia Persia, and also in Central and South America The skin of the dark races renders it difficult to recognise the exanthem, or even conceals it entirely

Relapsing fever and bilious typhoid which are only modifications of the same disease are far more largely distributed British India is one of the most important centres of these diseases, which are observed to be particularly prevalent there in periods of famine

Chastang identifies a disease occurring in Korea and there called *Im pyeng* with relapsing fever, although relapses do not seem to be present in it

The disease sets in between February and July and particularly affects poor people living under unfavourable hygienic conditions It is accounted very contagious so that the patients are often left unattended

sets in on the sixth or seventh day and after from twenty four to thirty six hours defervescence occurs Great feebleness and cardiac weakness follow frequently also bronchitis and from these ailments the patient makes a slow recovery

CHOLERA although endemic in certain tropical countries is carried into other zones by human intercourse where it behaves in the same manner as in the tropics stamping it as a cosmopolitan disease It is described

but rarely the seat of epidemics is that the disease has either not been carried in at all or has *not spread in consequence of the limited inter* course The course of measles in the tropics is mostly mild The great ravages made by the disease in a few epidemics amongst uncivilised populations—about one quarter of the population on the Fiji Islands succumbed to measles in 1874—may be attributed less to the severity of the disease than to lack of care and treatment

SCARLET FEVER in contradistinction to measles is generally very scarce in the tropics or quite unknown It is observed very rarely in British India It occurs most frequently amongst European children in Shanghai (in Hong Kong only imported cases are seen) in Java and on the Congo Singapore Bangkok Tonquin Annam Cochin China Manila Borneo Natal Western Australia the Tonga and Samoa Islands Honduras and many other places are free from it In North America scarlet fever is rarer and milder in the Southern than in the Northern States and whites are attacked more frequently and more severely than negroes and Indians

disease with them is a severe one As might be expected smallpox exhibits a different aspect on the negro s skin than on the white man s First of all papules the size of lentils with œdematous areas and small depressions in their centre develop and these papules are transformed into pustules without change of colour In mild cases the pustules heal with circumscribed cicatrices without leaving depressions and in a month or two t

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experiences collected in Africa affords the same protection as with us but the immunity acquired against smallpox as well as against repeated inoculation is supposed to be less lasting and this is also the case as regards immunity acquired from having had the disease Repeated attacks and repeated efficacious inoculations in the same individual are not rare

A Plehn states that in negroes of the West Coast of Africa the efficacy of vaccination after twelve months can only be reckoned on in a fraction of the cases and after the expiration of two years only exceptionally

The course of vaccination is more rapid in torrid than in temperate zones

It is very difficult to obtain active vaccine, as lymph is injured by its transport to [illegible]
during the h[illegible]
Even also i[illegible]
of the lymp[illegible]
case in continuous inoculations from arm to arm In Saigon and British India buffalo lymph has proved of far greater efficacy and durability than calf lymph whereas in the Dutch Indies the experience has not been equally good In British India the addition of vaseline to the lymph has proved of value in preserving it, and it possesses the additional advantage of not being affected by the heat

CHICKEN POX occurs in the tropics, although but rarely mentioned in medical reports

ERYSIPELAS is relatively rare in the tropics I have likewise observed it but rarely in Japan In the coloured races the exanthem does not cau[illegible]
[illegible]
a m[illegible]
does[illegible]
but Europeans are more often attacked than natives

[illegible]

TETANUS is extensively distributed in the tropics The natives have a remarkable susceptibility to it, but this is at least partly explained by the circumstance that they are particularly liable to injuries on account of [illegible]

to two thirds and more of all newly born infants succumbed to it, and in consequence it was called ' the scourge of St Kilda

PNEUMONIA is very unevenly distributed in the tropics Thus it is very frequent in Cameroon and on the Congo particularly in negroes whereas in the Dutch Indies severe inflammation of the lungs is hardly ever observed in natives According to my experience in Japan also croupous pneumonia is a rare disease

WHOOPING COUGH is likewise frequent in some tropical countries, in others, on the contrary, it is rare, or utterly unknown In 1895 according to A Plehn, the first epidemic of this disease was observed on the West Coast of Africa It sometimes appears in a very severe form In the epidemic of 1883 occurring on the Fiji Islands 3 000 natives are said to have succumbed to it

INFLUENZA in its wanderings visits the tropics in the same manner as it does the higher latitudes

EPIDEMIC PAROTITIS is exhibited within the tropics with unequal frequency Thus it is found very frequently on the West Coast of Africa

but is not known in Manila and Singapore Its course, as a rule is very mild

plains, while in the hill stations it is supposed to be as prevalent as it is in Europe It occurs frequently in Singapore Cochin China and China, but it is very rare in Japan In Cameroon it is fairly frequent in Europeans as well as in natives

CHRONIC RHEUMATISM and MUSCULAR RHEUMATISM are, it may be mentioned, ubiquitous diseases in the strictest sense of the word There is a great tendency to chills in the tropics, in natives as well as in Europeans

TUBERCULOSIS shows a different condition in different tropical countries In any case the opinion formerly expressed that this disease is more frequent in torrid than in temperate zones has no validity There are districts in which it is of common occurrence and others where it is either entirely absent or very rare It is largely distributed in British India, more especially amongst the natives It is also frequent amongst the natives of Manila and the New Hebrides On the other hand, it is seldom met with on the west and south coasts of tropical Africa, in Cameroon indeed it is according to A Plehn quite unknown In this respect, however, the reports of separate observers do not coincide In contradiction to A Plehn Zahl states that tuberculosis is frequently met with in Cameroon The distribution of this disease in the tropics is more governed by the density of the population conditions of housing and feeding, and the absence or presence of industries than by climatic or racial peculiarities It is also observed in the tropics that the disease is of rarer occurrence in a dry climate than in a damp one, and that high altitudes have a favourable influence

The assertion that the course of tuberculosis in the tropics is by far more rapid than with us is also incorrect For instance it is reported from Manila that the course of the disease is slower there than in Europe

That which has been said above also holds good for pulmonary tuberculosis Little has been mentioned in medical reports about articular- and osteo tuberculosis

In a few reports the absence of LUPUS is remarked upon as in Bangkok, Singapore Java and Madura although tuberculosis is of frequent occurrence in these places In Japan also where not only tuberculosis, but also scrofula, bony caries articular inflammations, &c , are very frequent, lupus does not seem to occur at least I have never met with such a case In Manila and on the Fiji Islands where tuberculosis is frequent, lupus is not uncommon

SYPHILIS is distributed nearly all over the tropics It is only absent in the districts that have not been opened to commerce It is a sad fact, and one that cannot be denied that the advent of foreigners into remote [illegible]

not yet reached the natives of New Guinea

The course of this disease varies in the tropics Sometimes it does not deviate from syphilis as observed in Europe, sometimes, as in tropical

America it is more severe sometimes as in various parts of tropical Africa it is remarkably mild This shows that climate alone exercises no influence on its course Perhaps however besides the kind of or lack of treatment race may have some influence The black race seems to possess a certain immunity the course of syphilis in them is in general a mild one It is also decidedly remarkable that in those parts of Africa where the scourge is being imported as for instance in the Congo State it does not cause great epidemic ravages as in other newly

Reports from a few countries such as Sumatra and the Marshall Islands state that the disease rapidly assumes the tertiary stage On the Marshall Islands the tertiary symptoms are sometimes seen in natives (not in Europeans) only a few months after infection whereas secondary symptoms are not observed

I have made similar observations in Japan where syphilis is very wide spread but is not generally speaking more severe than in Europe I very seldom observed maculo papular syphilides in Japan but this is perhaps explained by the darker pigmentation of the skin in place of this however there is often pustular impetiginous exanthems which mark the transition into the tertiary stage Moreover in the secondary stage pains in the bones and joints occur, and tertiary symptoms (gummata ulcers and affections of the bones) are apt to set in very early

The assertion was formerly made that syphilis when transmitted from one race to another was particularly severe No support is given to this view in the most recent literature and observations made by myself and others in Japan also failed to confirm the statement

Soft chancre and gonorrhœa with their sequelæ are found everywhere in the tropics As may be gathered from the publications on the subject they have for ages been classed with the ubiquitous diseases In regard to venereal buboes it may be remarked that they sometimes set in with and their course is accompanied by high fever In Chili scrotal abscess is often observed as a consequence of ordinary gonorrhœa attributable to the fact that the Chilians even when affected with the ailment are accustomed to be all day on horse back

As to Diseases communicable from animals to man hydrophobia is by no means uncommon and West Africa India Malacca Annam the Dutch Indies and tropical America belong to its geographical regions of distribution

As yet there are no accounts of the occurrence of glanders and anthrax in the tropics

Insolation and heat apoplexy are in general far less common within the torrid zone than one would *a priori* be led to expect In some of the hottest countries they do not occur at all or only very rarely come under observation The reason for this is in all probability due to the precaution with
from the direct
exert on if how
of soldiers they should be suitably clothed and above all should not be burdened with baggage Sambon in consequence of the geographical

of heat but as an infectious disease which he designates *siriasis*. The form he alludes to is characterised by hyperpyrexia, profound coma, contracted pupils and severe pulmonary congestion; these symptoms are usually preceded by prodromal symptoms and followed not rarely by relapses Sambon has, however, hitherto not gained many supporters for his hypothesis

In regard to CONSTITUTIONAL DISEASES, *rickets* are very rare in the tropics, and are even unknown in many countries In Japan I have never observed the disease Coinciding with the present views as to the

particularly observed after bad rice harvests, in British India where prisoners in gaols are particularly affected by it, in Cochin China, the northern districts of China, on the west coast of Africa, in the Eastern Soudan, and in Western Australia In other regions, as in Singapore and Manila, on the other hand, it is unknown In Japan, one case only came under my notice Scurvy is quite independent of climate, but is intimately connected with food Formerly it was an equally frequent guest in Polar and Equatorial seas on board ships making long voyages

DIABETES is reported as a frequent occurrence in various tropical countries In Ceylon and British India it is more frequent amongst Europeans than in Europe, and it is still more frequent in the case of natives than it is in Europeans It seemingly, on the other hand, does not exist in tropical Africa, and this is probably also the case in Central and South America I have observed a limited number of cases in Japan

GOUT, as a rule, is very rare, or entirely absent, in the tropics In India it is only observed in Europeans and Mohammedans, not in Hindoos In Japan I never observed a case That the rarity of gout in warm countries is not alone due to the moderate manner in which natives live, whose staple diet consists of vegetables and who rarely partake of alcohol, is proved by the extreme rarity or absence of the disease in warm countries such as Brazil, where the inhabitants are in the habit of living luxuriously

GOITRE, with and without *cretinism*, is endemic in many tropical districts, mountainous as well as flat. No race or nationality seems to enjoy immunity from these affections. Only of the Dhanghours, the natives of [illegible] to possess a con

that they seldom

most notoriously

countries, such as the Antilles (Martinique, Barbados) and in India, that it is met with,

China, on

of Japan,

majority of

the most frequent occurrence, the disease being particularly frequent in negroes Pneumonia and tuberculosis have been considered above

We know little of the DISEASES OF THE ORGANS OF CIRCULATION In Europeans *functional heart ailments* come under observation and heat seems to play an important part in their etiology In choosing persons for service in the tropics it is therefore necessary to make a careful examination of the heart and vessels

DEFECTS OF THE CARDIAC VALVES occur frequently in some countries in which acute articular rheumatism is rare as in British India Other causes must therefore be taken into consideration It is reported from Buenos Ayres that heart disease especially aortic disease and aortic aneurism is very frequent in the negro population Chronic *endarteritis* and *aortic aneurism* are frequently observed in Europeans as well as in natives in India China Brazil and Chili Aneurism of the aorta is

As to the DISEASES OF THE DIGESTIVE ORGANS *gastric* and *intestinal catarrh* are more frequent in the tropics than in Europe and affect both Europeans and natives With regard to the symptomatology and the pathological changes met with in these complaints they exhibit no material differences from those of the temperate zone with the exception that they

anæmia a

sensitiven

able to th

intestinal muscles rendering the mucous membrane of the intestine more easily affected by the effects of infectious lesions than they would be under normal conditions

Errors in diet contributed to by the rapid decomposition of articles of food and by the tendency to chills furnish incidental causes

It was previously mentioned that Bertrand and Fontan identify chronic diarrhœa of the tropics with chronic dysentery

A disease that appears on the west coast of South America (between

liver Negroes are very rarely affected

INTESTINAL PARASITES are remarkably frequent in the tropics Besides the parasites peculiar to warm countries that have already been discussed *ascaris lumbricoides oxyuris vermicularis trichocephalus dispar, tænia solium tænia mediocanelleta bothriocephalus latus* which are endemic in Europe are met with everywhere in the tropics especially amongst natives Climate and race have less influence on the spread of these parasites than the kind of food and the sanitary conditions of the various nations mentioned more sensitive in the tr ects more severely to the parasites n one usually observes in Europe pics to examine the stools of patients suffering from intestinal disorders for the ova of parasites

I may at this point consider other parasites *Trichinosis* is excep ases were reported from observat on a few times e imported from China China where pigs play although medical reports

thereon are not forthcoming, it is even not improbable that trichinosis originated in China for the discovery of the disease in man in Europe took place towards the end of the third decade of last century, almost simultaneously with the introduction of small Chinese pigs into Europe

The occurrence of the *echinococcus* is very limited in warm countries as it has hitherto only been met with in India Algiers Egypt and Victoria (Australia)

There is b[illegible]
APPARATUS I[illegible]
Chills caused [illegible]
etiological fac[illegible]
calculi in certain tropical countries has also been considered

In regard to the DISEASES OF THE NERVOUS SYSTEM we have already seen that the influence of the tropical climate on the nervous system of *Europeans* is principally manifested in *sleeplessness* and *nervous irritability* which particularly if in conjunction with the effects of malaria may develop to considerable neurasthenia Such patients exhibit boundless excitement to which they were formerly not subject so that [illegible]

prominent symptoms are extreme apathy an aversion to all mental work, and an irresistible desire to sleep after every meal A few patients complain of giddiness pressure in the head headache, oppression in the chest indefinite sensations of anxiety more or less precordial agony, nervous palpitation of the heart sometimes also there is nervous dyspepsia The moods vary considerably gliding into the extremes of joy and sorrow on the slightest cause on the other hand the patient may bear the strokes of misfortune with a sort of resigned stupor later on, hallucinations may set in

In the initial stage of this disease F Plehn recommends that the patient take plenty of exercise in the evening that he drinks a bottle of stout that he has a cool douche or a bath just before retiring to rest but above all that the bed be so placed that the patient is fully exposed to the influence of the breeze Should these measures fail to afford relief [illegible]

are still further increased if contributed to by other predisposing causes such as *heredity*, *excesses*, *exhausting diseases* *insolation*, *or other* circumstances originating nervous disorders Rudimentary or fully developed *mental derangements* may then ensue Mental diseases there [illegible]

climates On this subject [illegible] follows "The alleged disorder has been expressly fabricated by laymen according to whether the affected persons are governed by pleasure or hatred There are relatively, a great many eccentric characters amongst

Europeans living in the far distant colonies, for the quiet ordinary man prefers to remain in his comfortable native land ' The opportunity is afforded in isolated and distant lands for the weak characters to lose their moral equilibrium, in Europe they are under the stern eye of the law, and of society, and custom compels limitations to one's conduct The same type of persons who suffer from the so called tropical frenzy in the colonies are inclined to excesses everywhere, even at the North Pole, as soon as the strait jacket of civilisation is loosened "

Perhaps "*Soudanite,*" a disease stated to be due to the effect of heat in conjunction with malaria, appertains to the same category of disease as tropical frenzy The condition is thus designated in consequence of the mad acts of two French officers in the French Soudan, who fired on their native flag and killed two of their comrades and part of *their escort*

"Soudanite ' is supposed to commence with melancholia slight fever and anæmia

A great many children of European parents die in the tropics from *eclampsia,* malaria *being its most frequent cause The disease is also not* uncommon in the children of natives

We know but little of the nervous diseases of the *natives* of tropical countries, but we are aware that different races, especially as regards mental diseases, exhibit considerable differences, attributable, no doubt, to racial peculiarities, or the different surroundings in which the various nations have been born and reared

state Mental disorders are rare amongst other blacks (Australians, Melanesians, and Negritos)

On the other hand, dementia is very prevalent amongst the Malays,

tions of degenerative insanity, which, however, according to van Brero, *whose statements I quote, are* rather *to* be attributed to imperfect mental development in the ethical and intellectual direction than to a racial degeneration

appear on all parts of the body with the exception of the palms of the hands and the soles of the feet, and they exhibit a far more acute course than the furuncles of temj
du Nil, and in the East
connection with the Nile

wounds On the ears the keloids sometimes cause the formation of disfiguring tumours as large as billiard balls, or even larger

Vitiligo, often extensively distributed over the body, is also not uncommon in coloured people In a few countries, such as India, actual Albinos are met with remarkably frequently

DISEASES OF THE EYE are universally frequent in the tropics The diseases of the conjunctiva and cornea predominate *Blenorrhœa* and *trachoma* are remarkably frequent The former in some countries, as in Japan is next to small pox the principal cause of the number of blind persons To trachoma the
disposition According to
Esquimaux, possess entire
relative immunity, on the
it, and especially the Jews
Japanese, however, are sup
the disease

Xerosis conjunctivæ is, moreover, a frequent disease in tropical and subtropical countries as a rule it is connected with *hemeralopia*, and we
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an
Melanesians, the disease appears to be very frequent
in the natives of Toba (Sumatra) who often suffer from it and call the disease *rondar manok*—*i e*, hen blind, it is usually associated with slight albuminuria

A and F Plehn occasionally observed *nyctalopia* in Cameroon as well as in German East Africa as a consequence of the dazzling light, the weakness of sight amounting to almost entire day blindness, lasted for weeks and months, but which was as a rule curable by means of suitable treatment, namely protection from light In addition to slight redness of the conjunctiva, a slight inflammation of the retina could only exceptionally be demonstrated, the result of ophthalmoscopic inspection was mostly negative

I am myself aware how defective and incomplete the above statements are They, however, represent in brief what I have personally observed on the subject and what I have gathered in the literature known and accessible to me

Perhaps these lines will give the impetus for further publications which will contribute to the demands on our knowledge as to the occurrence and condition of the cosmopolitan diseases in the tropics

ADDENDUM TO CHAPTER ON YELLOW FEVER

BY JAMES CANTLIE M B F R C S

OUR knowledge of yellow fever has been advanced considerably since Scheube s work appeared as the result of the investigations of the U S Army Commission on the Island of Cuba during the years 1900 and 1901 The chief points brought out by the experiments conducted by the members of the Commiss on are as follows —

I —*No Bacterium of any kind could be detected in a cultivated form in the blood of persons suffering from Yellow Fever* —In view of the many organisms that have been from time to time announced as causative of yellow fever this is a most important statement Prev ously to the inves tigations of the Comm ssion all the bacteria alleged to have been

tive results —In a specially prepared house with every other means of conveyance of yellow fever guarded against healthy (non immune) persons were made to sleep in beds in which blankets mattresses sleeping apparel pillow cases &c *had been used by or saturated with the* excreta vomit &c of yellow fever patients Although a lengthy exposure was kept up amounting to several weeks none of the persons thus exposed contracted the disease So thoroughly and scientifically was this experiment carried out that the negative influence of fomites in regard to the spread of yellow fever must be regarded as settled

III —*Infection by Mosquitoes Positive results were obtained as to the spread of Yellow Fever by infected Mosquitoes* —The experiment was carried out in a newly erected building where twelve healthy persons were shut up and exposed to the bites of mosquitoes, belonging to the species Stegomyia fasciata that had already fed on yellow fever patients Ten of the twelve persons thus experimented on contracted yellow fever Control experiments were carried on contemporaneously by submitting non immune persons in the same building but guarded from mosquito bites by a mosquito proof screen no person thus protected contracted the disease

IV —*Period of*
days must interve
fever poison and tl
Mosquitoes howev

seven days after contamination, proved capable of conveying the disease Further infected Stegomyia fasciata may survive for a period of seventy one days after having absorbed the yellow fever poison

V.—*The Blood of Yellow Fever Patients, when inoculated into healthy (non immune) persons causes Yellow Fever*—This is true, whether the fresh blood from a vein of a person suffering from yellow fever be injected into a healthy (non immune) person or whether the blood be partially defibrinated

VI—*Bacteria Free Serum Filtrate injected into a healthy (non immune) person causes Yellow Fever*—When blood drawn from a case of yellow fever and diluted with sterilised water is passed slowly through a Berkefeld laboratory filter (through the pores of which no known bacterium can pass) the diluted serum thus obtained caused yellow fever when injected into the vein of a healthy (non immune) person This experiment serves to confirm as far as our present laboratory methods of investigation can do so that yellow fever is not due to the presence of a bacterium

VII—*The Specific Agent which produces Yellow Fever is destroyed by exposure to a temperature of 55° C for ten minutes*—It may be that the specific agent is not wholly destroyed but only so attenuated that even 1 5 ccm of the blood which had been so heated failed to produce the disease when injected into a non immune person

These several experiments prove —

(*a*) That the virus of yellow fever is contained in the blood

(*b*) That the specific agent in producing the disease is destroyed or attenuated by exposure to a temperature of 55° C for ten minutes

(*c*) That yellow fever is not caused by a bacterium in the blood

(*d*) That the disease is not spread by fomites but by a mosquito

Prevention of Yellow Fever—The logical outcome of the above statements and conclusions is that 'the spread of yellow fever can be most efficiently controlled by the measures directed to the destruction of mosquitoes and the protection of the sick against the bites of these insects The practical application of the principle adduced in this axiom also proved wholly satisfactory Every yellow fever patient in Havana was not only quarantined but the room in which the patient lay was protected with wire screens so that mosquitoes could not reach the patient or

he house in which patients were destroyed by various methods with the result that Havana was for the first time for some forty years freed of the disease

It would appear, therefore that the quarantine regulations in force against yellow fever require modification if not complete revolutionising

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ADDENDUM TO CHAPTER ON MALARIA.

From July, 1900 to October 1902

BY C W DANIELS M B, M R C S,

Medical Superintendent of the London School of Tropical Medicine

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Since Dr Scheube wrote this article much work has been done in connection with malaria and mosquitoes Numerous observers have proved conclusively that malaria is carried by mosquitoes belonging to the genus *Anopheles*, and all experimental attempts with other mosqitoes have failed

It has been further shown that the phases, in the mosquito, of the human malaria parasites are in all main points identical with those completely described by Ross for the proteosoma and previously in part described for the human parasites by him

It has been proved that persons living in an intensely malarial place, but completely protected from mosquito bites do not contract malaria,[1] showing that the mosquito is, if not the only infecting agent, at any rate the important one

Malaria has been contracted by men in non malarial countries[2] when bitten by mosquitoes infected with malaria elsewhere, imported into the non malarial country In all cases the type of fever contracted by persons bitten by mosquitoes purposely infected has been the same, benign tertian, as that of the person from whom the mosquitoes derived their infection

Although all the mosquitoes so far proved to carry malaria belong to

Prof Scheube *A claviger*, is probably the important carrier only in

many of them have not as yet been experimented with

As regards the life history of the mosquito, the most important practical advance is the recognition of the part played by rivers streams, springs, and large collections of fresh water, when the margins are over grown with grasses and sedges as breeding grounds of anopheles[4]

The evidence that man is the *only intermediate host of the malaria* parasites has considerably increased and the recognition that immunity is not racial or constitutional but acquired by previous attacks has removed some of the difficulties in accounting for the distribution of malaria

Many workers in the tropics who had to deal with children were quite familiar with the fact that negro children frequently have malaria whilst adults were exempt or nearly so *Post mortem* examinations in British Guiana had shown that over 60 per cent of the children of all nationalities and the same proportion of negro children showed evidence of previous malaria in the shape of melanin deposits in the spleen between 2 and 5 years of age and also that the fatal convulsions of children were mainly in that country due to malaria[5] Koch[6] showed that even children apparently in good health frequently harbour malaria parasites Other observers have confirmed and amplified these facts It is now known that in countries where malaria is early acquired by new comers young children of the native races suffer severely from malaria whilst adults do not In other countries where susceptible new comers live for years without being infected the native adults show no such immunity In

Residence in a non malarial country results in loss of immunity even

A more general study of the relationship of enlargement of the spleen to malaria has led to important results It had been shown previously that the ages [illegible] not correspond with [illegible] was most common in E[illegible]pleens are usually free fr[illegible]ristophers have shown t[illegible]only found splenic enlargement is not so common as at later ages and parasites were very rarely found in a large series of patients with enlarged spleens *These conclusions do not hold good for negroes as enlarged spleens are* only common amongst them at ages little greater than those at which parasites are common

In all other races Europeans Chinese East Indians South American Indians &c the spleens enlarge in malaria and in a fair proportion of cases residence in a malarial country leads in these races to a chronic progressive splenic enlargement apparently quite independent of subsequent malarial attacks and persisting and increasing after immunity to the parasite is acquired Pyrexia not accompanied by malaria parasites in the blood is common in such cases and it does not yield to quinine The spleen test as a test of the prevalence of malaria in a country or district is only of value when age and race are also considered[8]

Much work has been done on the relative proportions of the various forms of leucocytes during malaria and it has been shown that a marked relative increase in *the large mononuclear leucocytes takes place and* persists for a considerable period after the parasites have ceased to be found This leucocyte variation is not affected by quinine and though sometimes found in other diseases is a valuable indication of recent malaria In practice it is of great use as it enables us to exclude malaria in persons who have been taking quinine for supposed malaria as in such cases the absence of parasites from the blood is no evidence against

supposition that the case was one of malaria, whilst the absence of this leucocytic variation is conclusive

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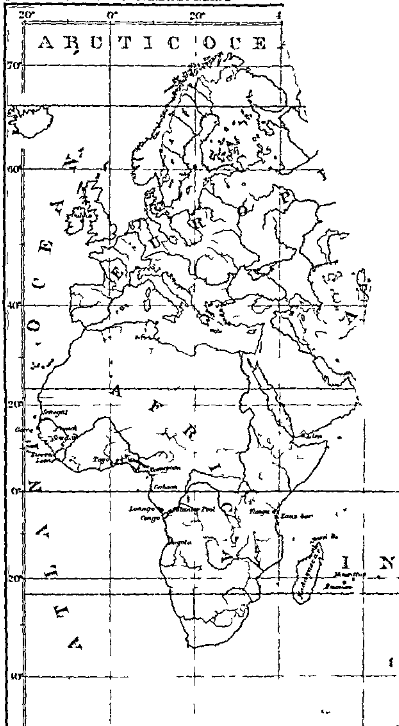
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